This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

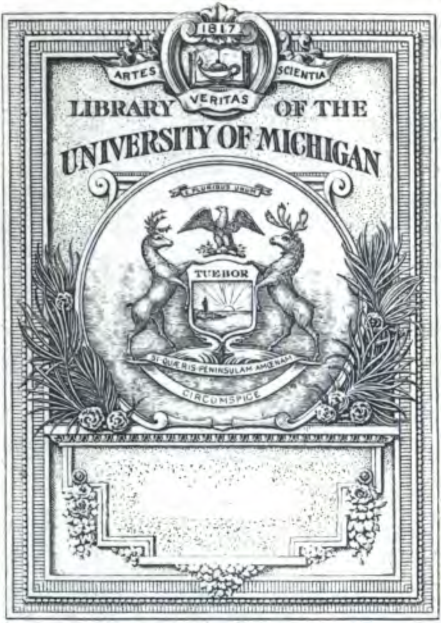
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`


LIBRARY OF THE
UNIVERSITY OF MICHIGAN

QA
35
.A98
1711

Arithmetick:

A

TREATISE

Deſined for the Uſe and Benefit of

TRADES-MEN.

Wherein the
Nature and USE of *FRACTIONS*,
both *Vulgar* and *Decimal*, are
TAUGHT by a New and Eaſie
METHOD.

ALSO
The Menſuration of SOLIDS and
SUPERFICIES.

The Eleventh Edition, Corrected and Amended.

By *J. ATRES*, late *Writing-Maſter*
in St. *Paul*'s Church-yard.

London: Printed for *Tho. Norris* at the *Looking-Glaſs* on *London Bridge*, and *Dan. Midwinter* at the *Three Crowns* in St. *Paul*'s Church-Yard. 1711.

QA
35
.A92
1711

To the Right Honourable
Sir William Aſhhurſt, Kt.
LORD MAYOR
OF THE
City of *LONDON*.

This Manual of
Practical Arithmetick
IS
HUMBLY DEDICATED
AND PRESENTED
BY

Your Lordſhip's
Moſt obliged
Humble Servant,

John Ayres.

THE PREFACE.

THIS *Manual of Practical Arithmetick is adapted chiefly for the* Benefit *and* Uſe *of* Tradeſmen, *is the Product of ſome vacant Hours. A* Work *for its Nature and Kind* differing *from any thing heretofore Publiſhed that I know of: All the* Rules *being made* plain *and* eaſie *to the* meaneſt *Capacities, for whoſe ſakes it is principally intended: which is the Reaſon ſo much of the* Book *is taken up in* Explaining *and Teaching the* Groundwork, viz. *Addition, Subtraction, Multiplication, and Diviſion, which moſt Arithmetick Books are deficient in; a Defect in any of theſe Rules will render the Labours of ſuch as learn Arithmetick by Books very difficult and hard. To help which I have firſt of all laid down the* plaineſt way of Diviſion *for a Learner that wants the help of Maſter, and afterwards have given the* ſhorteſt Italian way of Diviſion. *I have alſo omitted ſeveral Rules that are not of Uſe in Trade, ſuch as* Alligation Bartier, Loſs and Gain, Company with Time, *&c. And have ſupplied thoſe Omiſſions with what is more Uſeful and Practical,* viz. *Great Enlargements, and Variety of the Golden Rule of Three, The Rule of Three Inverſe, Double Rule of Three, and the Uſe of the Compound Rule of* Five Numbers *in working Intereſt, and the Nature of Exchange, Rules of Practice, with great Variety, and* ſhort ways *to caſt up* Merchandize. *The Order of* Deducting *Tare and Tret, with other Rules uſeful in Trade. Laſtly, I have made* Fractions *very eaſie and familiar (though differing from any former Method) having mixed both* Vulgar *and* Decimal Fractions *together under the ſame Head, that the Ingenious may diſcover the Eaſe as well as Excellency and Brevity of the* Decimal *beyond the* Vulgar Fraction. *And as my Paper would admit, have added ſome Variety of Meaſuring Superficies and Solids.*

The Faults in the former Impreſſions, care has been taken to correct in this Eleventh Edition.

Arithmetick.

Hist. of Sci.
Hufford
11-18-26
14891

CHAP. I.

Of NUMERATION.

I. ARITHMETICK is the Art of Numbring well, or of Accompting well by Numbers; For as Magnitude or Greatneſs is the Subject of *Geometry*, ſo is Multitude or Number the Subject of *Arithmetick*.

II. The whole Art of *Arithmetick* depends upon the true Knowledge of the Five following Rules, viz. *Numeration*, *Addition*, *Subtraction*, *Multiplication* and *Diviſion*. All the other Rules being compounded of theſe, we ſhall treat particularly of them in their order.

III. *NUMERATION Teaches to expreſs or write down the value of any Number whatſoever propoſed.*

IV. All Numbers are written with Ten Characters called Figures, of which the laſt is called a Cypher, and of it ſelf ſignifieth nothing, but ſerveth (according as it is placed) to increaſe or diminiſh the value of another Figure to which it is either annexed or prefixed.

V. The *Ten* Characters or *Figures* by which all Numbers are expreſſed, are thus *written*, viz. 1, one; 2, two; 3, three; 4, four; 5, five; 6, ſix; 7, ſeven; 8, eight; 9, nine; 0, Cypher; The Nine firſt of theſe are called ſignificant Figures.

H.C.M.

VI. All Numbers are either *Simple* or *Compound.*

~~1. A Number is ſaid to be *Simple*, when it~~ conſiſteth but of *one Figure*, as 4, 8 and 6, *&c.* are ſimple or ſingle Numbers.

2. A Number is ſaid to be a *Compound* Number when it is compoſed of *two*, *three*, *four*, or *more Figures*; ſuch as are 35, 356, and 7428, *&c.*

VII. Every *ſignificant Figure* hath a double Value, *viz. Certain* or *Uncertain.*

1. The *value* of a Figure may be ſaid to be *certain*, when it ſignifieth *ſimply* its *own* proper *value*, without the Addition of any other word for its explanation; and ſo 4 ſignifieth *four*, 8 ſignifieth *eight*, and 9 is *nine*, &c.

2. The *value* of a Figure may be ſaid to be *uncertain*, in reſpect of the *place* it may ſtand in, and ſo 4 may ſignifie *forty*, or *four hundred*, or *four thouſand*, &c. and 8 may ſignifie *eighty*, or *eight hundred*, or *eight thouſand*, &c.

VIII. When a *Number* is compoſed of divers *Figures* ſet together like the Letters in a word, that *Number* is ſaid to *conſiſt* of as many places as there are *Figures* uſed in the compoſing thereof. So the Number 4643 is ſaid to *conſiſt* of *four* places, becauſe it is compoſed of *four* Figures; the like is to be underſtood of any other.

IX. The *places* in *every Compound* Number are to be conſidered both as to their *order*, and their *value.*

1. The *Order* of the *places* is from the *right hand* to the *left*, the *firſt Figure* or *Cypher* towards the *right hand* is ſaid to poſſeſs the firſt place, and the next towards the *left hand*, is ſaid to poſſeſs the ſecond place, and the next to that the third place, *&c.*

So if this Number were propoſed, *viz.* 5734, here 4 is ſaid to poſſeſs the firſt, 3 the ſecond, 7 the third, and 5 the fourth place, &c.

2. The *value* of every Figure is *diſcovered* by the place that it ſtands in; *viz.* The *firſt* place is the place of *Units*, or ones; and the Figure that ſtandeth in that place ſignifieth its *own* proper or *ſimple* value. The *ſecond* place is the place of *Tens*, and the Figure that ſtandeth there ſignifieth as many *Tens* as the Figure it ſelf containeth *Unites*: As if it be 4, it ſignifieth four *tens*, or forty; if it be 7 it ſignifieth ſeven *tens*, or ſeventy, &c. The *third* place is the place of *Hundreds*, and the *Figure* that ſtandeth there, is as many *hundreds* as it containeth *Unites*: So 5 in the third place is five hundred, and 6 ſignifieth ſix hundred, &c. The *fourth* place is the place of *Thouſands*, and the Figure that ſtandeth therein ſignifieth as many *thouſands* as it contains *Unites*; ſo 8 in the fourth place is eight thouſand, and 4 is four thouſand, &c. As,

Suppoſe this Number, *viz.* 4652, were given to have its *value* expreſſed; The Figure 2 (in the firſt place) is two *Unites*, or ſimply *two*, the Figure 5 (in the ſecond place) is five *tens* or fifty; ſo 52 is thus expreſſed, *viz.* *fifty two*: The Figure 6 (in the third place) is ſix hundred, ſo 652 is thus expreſſed, *viz.* *ſix hundred fifty two*; the Figure 4 (in the fourth place) is *four thouſand*, ſo 4652 is thus to be read, *viz.* *four thouſand ſix hundred fifty two.*

In like manner if any Figure hath a *Cypher*, or *Cyphers* annexed to it, it ſhall ſtill retain the *value* of its place, as much as if a ſignificant Figure, or Figures, were annexed to it in the room of the *Cypher* or *Cyphers*; ſo if the Figure 6, there be a *Cypher* annexed thus (60) its value is *ſix tens* or *ſixty*, becauſe it ſtandeth in the ſecond place, or place of *Tens*. Likewiſe if it have two *Cyphers* annexed to it thus (600), its value is *ſix hundred*, becauſe it poſſeſſeth the third place, or place of *Hundreds*. Alſo 6000 is *ſix thouſand*, becauſe 6 ſtandeth in the fourth place, or place of *Thouſands*.

And the value of any Figure increaſeth in a *Decuple* proportion from the *right* hand to the *left*, every place being *ten times* the value of the former, as you may ſee in the following Table.

Numeration Table.

Hundreds of Millions	*Tens of Millions*	*Millions*	*Hundreds of Thouſands*	*Tens of Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*	*The Numbers in the Table are thus to be Read, viz.*
9	8	7	6	5	4	3	2	1	987 Mil. 654 Th. 321
1	2	3	4	5	6	7	8	9	123 Mil. 456 Th. 789
	2	3	4	5	6	7	8	9	—23 Mil. 456 Th. 789
		3	4	5	6	7	8	9	—3 Mil. 456 Th. 789
			4	5	6	7	8	9	———456 Th. 789
				5	6	7	8	9	———56 Th. 789
					6	7	8	9	———6 Th. 789
						7	8	9	————789
							8	9	————89
								9	————9

Over againſt every place of the Numbers in the foregoing Table is written (in words at length) the value thereof; *viz.* *Unites*, *Tens*, *Hundreds*, *Thouſands*, &c. which words being perfectly gotten by heart, and well underſtood, the Learner will be thereby enabled to expreſs or write down the value of any Number propoſed.

And on the right hand of the Table, over againſt every Number therein contained, you have direction how to read or expreſs thoſe Numbers: As 987654321 is thus to be read, *viz.* *Nine hundred eighty ſeven Millions, ſix hundred fifty four thouſand, three hundred twenty one.* And the like is to be underſtood of the reſt.

Note, Although the foregoing Table be made to conſiſt but of Nine places; yet it may be continued to more places at pleaſure, even *ad infinitum*, obſerving that the value of every place is ten times as much as that which goeth before it; ſo the tenth place is *Thouſands of Millions*, the eleventh place is *Tens of Thouſands of Millions*, the twelfth place is *Hundreds of Thouſands of Millions*, and the thirteenth place is *Millions of Millions*, &c.

There is yet another Method uſed by ſome, that is very plain and uſeful in the expreſſing of great Numbers, or Numbers conſiſting of many places, which is this, *viz.* make a point after every third Figure, beginning at the right hand, as in the following Example.

Let this Number be propoſed conſiſting of fourteen places, *viz.* 84639042724536, and when every third figure is pointed it will be thus, *viz.* 84. 639. 042. 724. 536. every three figures being called a period, and are reckoned in order from the right hand towards the left, *viz.* 536 is the firſt Period, 724 is the ſecond

Period, 042 the third, &c. the firſt Period (which is 536) conſiſteth of *Units*, *Tens* and *Hundreds*, and is thus expreſſed, *viz. Five Hundred Thirty Six*, and every other Period is to be read in every reſpect as if it ſtood in the place of the firſt Period, only in expreſſing the value of the Second Period, you muſt add thereto the word *Thouſand*; to the third Period you muſt add the word *Millions*; to the fourth Period the word *Thouſands*; to the fifth Period *Millions of Millions*; and ſo the Number before propoſed is to be read as followeth, *viz.*

Millions of Millions · *Thouſand* · *Millions* · *Thouſands*

84.639.042.724.536.

Eighty four *Millions of Millions*, Six hundred thirty nine *Thouſand*, forty two *Millions*, Seven hundred twenty four *Thouſand*, Five *Hundred* thirty ſix.

CHAP. II.

OF ADDITION.

ADDITION Teacheth to add, or put together divers Numbers, and to bring them to one total Sum. As if ſeven and nine were given to be added together their Sum will be 16; and the Sum of 5 and 4 is 9.

II. *Numbers* to be added together, each of them *conſiſts* either of *one* Denomination, or of *divers*, as if it were required to add 16 *l.* to 14 *l.* here both the given *numbers* are of *one* Denomination, being *Pounds* only, without Shillings, Pence or Farthings: But if it were required to add 36 *l.* 14 *s.* 08 *d.* to 16 *l.* 12 *s.* 06. theſe conſiſts of *divers* Denominations, *viz.* of Pounds, Shillings and Pence.

III. When it is required to *add* together ſeveral *Numbers* of one *Denomination*, they muſt (in order to the work) be diſpoſed of according to the following *Rule*, viz.

Place *the given Numbers one under the other in ſuch order, that Units may ſtand under Units, Tens under Tens, Hundreds under Hundreds, Thouſands under Thouſands,* &c.

If you were to add 136 and 42 together, they muſt be placed one under the other as followeth, *viz.*

```
136    Or,   42
 42         136
```

IV. Having placed the given Numbers as before is directed, then draw a ſtreight line under them, and (beginning at the place of *Units*) add all the Figures together that ſtand over one another In that *Rank*; puting their Sum under the ſaid ſtreight Line; as in this Example, I ſay, 2 and 6 is 8, wherefore I put 8 under the Line, and in its proper place, *viz.* under 2 and 6, and proceed to the next Rank which is the place of Tens, ſaying, 4 and 3 is 7, wherefore I put 7 in its proper place under the line; and proceed to the next and laſt rank, where I find only 1, wherefore I put one in its proper place under the line, and ſo the work is finiſhed, and I find thereby that the Total Sum of 136 and 42 to be 178; See the Operation as followeth.

136	42
42	136
178	178

V. If in adding together any of the Ranks (as is before directed) their Sum amounts to, or exceedeth 10, or any number of tens, then in ſuch caſe you are either to ſet down a *Cypher* under the line in its proper place, or elſe the *exceſs* above the *ten* or *tens*; and for every *ten* carry an *unit* to be added to the next *Rank* of Figures. As if it amount to 30, then ſet down (0) a Cypher, and carry 3 (for the three tens) to be added to the next *Rank*, if it amount to 34, then ſet down 4 under the *Rank* that you *added*, and carry three to the next, *&c.* And when you have caſt up the laſt *Rank* or *Series* towards the Left Hand, ſet down the Total that it amounteth to, as in the following Examples.

	(1)	(2)	(3)	(4)
	748	4758	1648	20864
	364	6473	3472	78987
	296	2894	1865	6217
	242	1862	3479	4320
Sum	1650	15987	10464	110388

In the firſt of theſe Examples I begin, ſaying, 2 and 6 is 8, and 4 is 12, and 8 makes 20, which is juſt two tens; wherefore I put down 0 under the line and carry two to the next Rank for the 2 Tens, and proceed, ſaying, 2 that I carry and 4 is 6, and 9 is 15, and 6 is 21, and 4 is 25, which is 5 above twenty, wherefore I put down 5 under the line, and carry 2 for the two Tens to the next Rank, and then proceed, ſaying, 2 that I carry and 2 is 4, and 2 is 6, and 3 is 9, and 7 makes 16, wherefore (becauſe it is the laſt rank) I put down 16 under the line, and ſo the work is finiſhed, the total Sum of the Addition being 1650. The ſame is to be obſerved in the reſt of the Examples.

VI. Addition *of diverſe Denominations* cannot be well performed, until you know the value of common Coins, Weights and Meaſures, *&c.* As how many Pence make 1 Shilling, how many Shillings make 1 Pound, and how many Ounces make 1 Pound, how many Pound make a Quarter of a C. and how many Quarters make a C. weight.

In Addition of Engliſh Mony, it is neceſſary firſt of all to underſtand the meaning and ſignification of the Characters ſuperſcribed over every Sum, as *li. s. d.*

Note, That *li* ſignifies, **Libra**, a *Pound,* not here in reſpect of common Weight, but *Money,* and for diſtinction is called a *Pound Sterling.* So *s.* ſtands for **Solidus** (a Coin of Braſs) uſed by the *Romans* but with us of Silver, and ſignifies a *Shilling,* twenty of theſe Pieces make *one Pound Sterling.*

de. or *d.* ſtands for **Denarius,** a *Penny,* which contained ten Pieces of the *Romans* leaſt Coin: It hath had a various Eſtimate in our *Engliſh Coins.* It now ſignifies a Penny, the 12 part of a Shilling, or 12 of which make a Shilling. For until the Reign of *Henry* VI. a Penny was the 20th part of an Ounce of Silver, and in his Reign made the 30th. By *Edw.* IV. 40 Pence made an Ounce. By *Henry* VIII. there was allowed 45 *d.* to the Ounce. And by Q. *Elizabeth* an Ounce of Silver was divided into 60 parts, called Pence, as it is at this day.

ADDITION of MONEY.

Note, 4 *Farthings* is a *Penny*, 12 *Pence* a *Shilling*, and 20 *Shillings* a *Pound* Sterling, or Engliſh *Money*.

The following Tables ought to be learn'd by heart.

12 times	1 is	12
	2	24
	3	36
	4	48
	5	60
	6	72
	7	84
	8	96
	9	108
	10	120
	11	132
	12	144

d.	s.	d.
20 is	1	8
30	2	6
40	3	4
50	4	2
60	5	0
70	5	10
80	6	8
90	7	6
100	8	4
110	9	2
120	10	0

VII. When it is required to *add* together *Numbers* conſiſting of *Divers Denominations*, you are to place the given Numbers in ſuch order one under the other, that each Rank may conſiſt of one and the ſame Denomination. That is to ſay, if it be in Money: Let *Pounds* be ſet under *Pounds*, *Shillings* under *Shillings*, *Pence* under *Pence*, and *Farthings* under *Farthings*. The like is to be underſtood of *Weight*, *Meaſure*, *Time*, &c.

Then (having firſt drawn a Line under them) add them together, conſidering how many of each ſmaller Denomination make an Unit of the next that is ſuperior to it, (always obſerving to begin at the leaſt Denomination) and for every ſuch Unite, carry 1 to the next ſuperior Denomination, *viz.* If it be in Addition of Money, for every 4 in the Farthings you muſt carry 1 to the Pence (becauſe 4 Farthings is a Penny;) For every 12 in the Pence carry 1 to the Shillings (becauſe 12 Pence is a Shilling;) and for every 20 contained in the Shillings, carry 1 to the Pounds (becauſe 20 Shillings is a Pound;) And the odd Farthings, Pence and Shillings, ſet down in their proper Ranks under the Line, as in the following Example.

Some do indeed make a place of *Farthings,* and ſet a *q.* over them for *quartillier,* which is not very proper, and ſeldom uſed by Men of Buſineſs; therefore when you would write down three Farthings, or a Half-penny, or a Farthing, write it thus:

$\frac{3}{4}$ ——— *Three Farthings.*
$\frac{1}{2}$ ——— *A Half-penny.*
$\frac{1}{4}$ ——— *A Farthing.*

Let it be required to add together 134 *l.* 16 *s.* 08 *d.* $\frac{1}{4}$. and 286 *l.* 10 *s.* 4 *d.* $\frac{3}{4}$. and 498 *l.* 13 *s.* 06 *d.* $\frac{1}{2}$. and 794 *l.* 18 *s.* 09 *d.* $\frac{1}{4}$. Then in order to the work I ſet them down and draw a Line under them, as followeth.

℔.		s.		d.
134	:	16	:	08 $\frac{1}{4}$
286	:	10	:	04 $\frac{3}{4}$
498	:	13	:	06 $\frac{1}{2}$
794	:	18	:	09 $\frac{1}{4}$

Firſt, I begin with the leaſt Denomination, which is that of Farthings, and add them together, ſaying, $\frac{1}{4}$ and ' is $\frac{3}{4}$, and $\frac{3}{4}$ is 6, and $\frac{1}{4}$ is 7 Farthings which is 1 Penny and 3 Farthings, wherefore I put 3 Farthings under the Line, and under the Denomination of Farthings, and carry 1 (for the Penny) to the next Denomination of Pence, ſaying, 1 that I carry and 9 is 10, and 6 is 16, and 4 is 20, and 8 is 28, now 28 Pence is 2 Shillings 4 Pence, wherefore I put 4 under the Line, and carry 2 Shillings to the Denomination of Shillings, ſaying 2 that I carry and 18 is 20, and 13 is 33, and 10 is 43, and 16 is 59 Shillings, which is 2 Pounds 19 Shillings, whereof I put the 19 Shillings under the Line, and under the Denomination of Shillings, and carry 2 (for the 2 Pounds) to the Denomination of Pounds, and proceed, ſaying, 2 that I carry and 4 is 6, and 8 is 14, and 6 is 20, and 4 makes 24, wherefore I put down 4 under the Line, and carry 2 for the two tens to the next Rank; ſaying, 2 that I carry and 9 is 11, and 9 is 20, and 8 is 28, and 3 is 31, which is 1 above 30, wherefore I put 1 under the Line and carry 3 (for the three tens) to the next Rank, and proceed, ſaying, 3 that I carry and 7 is 10, and 4 is 14, and 2 is 16, and 1 is 17, wherefore I put 17 under the Line, becauſe it is the Sum of the laſt Rank; and ſo the whole work is finiſhed, and I find the Sum of the given Numbers to be 1714*l.* 19*s.* 4*d.* 03*q.* as by the following work appeareth.

134

	l.		*s.*		*d.*
	134	:	16	:	08 ¾
	286	:	10	:	04 ¾
	498	:	13	:	06 ½
	794	:	18	:	09 ¼
Sum	1714	:	19	:	04 ¾

To prove your Addition, after you have added your whole Sum, draw a Line with your Pen un the uppermoſt Number, or Sum, and then add gether all the other Numbers, *except* the *upperm* And when you have ſo done, add the Amount, Sum thereof to the uppermoſt Sum above the Li And if that Sum be equal to the Sum firſt fou the Work is true, otherwiſe not.

Here, *Note once for all*, that whatſoever Sums are to add together, whether of *Money*, *Weight*, *M* *ſure*, *Time*, &c. That when you come to the gre eſt Denomination, as you caſt up the ſeveral Ra thereof, you are to carry the Tens of every prec ing Rank to that which follows it, as is directed the Fifth Section of this Chapter, and as the Ra in the Denomination of Pounds in the laſt Exam are caſt up.

The Old common way of Addition of Money, to make a *ſpeck* or Tittle with your *Pen* at every that is found in the *Addition* of your *Pence*, and many ſpecks as you find, carry ſo many *Shilling* the place of Shillings, ſetting down what rema above 12 under the place of Pence. Then make ſpeck at every 20 you find in the *Addition* of y *Shillings*, and for ſo many *ſpecks* carry ſo m *Pounds* to the place of Pounds, ſetting down *overplus* under the place of Shillings, and then p ceed to add up the Pounds.

But the beſt Method, which I would commend to your Practice is this:

Firſt, Caſt up your Pence, or make a ſmall Comma at every 60 *d.* which is 5 *s.* (and it will be a great eaſe to the Memory where Sums are long) and by the foregoing Table you may readily know, how many Shillings and Pence your Pence amount to; then ſet down your odd Pence under the place of Pence, and carry your Shillings to the Unit of Shillings, and add them up as in Addition of Numbers, by ſetting down the odd above the Tens, and carry the Tens to the Tens of Shillings, or Angels (becauſe 10 *s.* is an Angel) then for every two in place of Angels carry ſo many Pounds to the place of Pounds. An Example or two will make it plain and eaſier.

Example I.

A Shop-keeper looking over his Shop-book, finds that A *owes him* 195 l. 11 s. 9 d. $\frac{1}{2}$. B 57 l. 14 s. 10. $\frac{3}{4}$. C 450 l. 10 s. 2 d. D 27 l. 16 s. 11 d. $\frac{3}{4}$. E 44 l. 13 s. 9 d. $\frac{1}{2}$. F 100 l. G 8 l. 14 s. 9 d. $\frac{1}{2}$. H 160 l. 10 s. 2 d. $\frac{1}{2}$. I 54 l. 11 s. 11 d. K 73 l. 9 s. 10 d. $\frac{1}{4}$.

In order to the work, place the Sums one under the others as is before directed, thus.

l. [illegible]

	l.	*s.*	*d.*
———*A*	195	11	9 ½
———*B*	57	14	10 ¼
———*C*	450	10	2
———*D*	27	16	11 ¾
———*E*	44	13	9 ½
———*F*	100	00	0
———*G*	8	14	9 ½
———*H*	160	10	2 ½
———*I*	54	11	11
———*K*	73	9	10 ¼
	1873	14	4 ¼

Then begin with the leaſt Denomination towards the right hand, which is Farthings, ſaying, 1 and 2 is 3, and 2 is 5, and 2 is 7, and 3 is 10, and 1 is 11, and 2 is 13 Farthings, which is 3 Pence ¼, wherefore put down ¼ under the Farthings, and carry 3 Pence to the place of Pence, and ſay, 3 and 10 is 13, and 11 is 24, and 2 is 26, and 9 is 35, and 9 is 44, and 11 is 55, and 2 is 57, and 10 is 67, and 9 is 76. Now by your Table 72 Pence is 6 *s.* therefore 76 is 6 *s.* 4 *d.* wherefore put down 4 *d.* under the place of Pence, and carry 6 *s.* to the place of Shillings, ſaying, 6 that you carry and 9 is 15, and 1 is 16, and 4 is 20, and 3 is 23, and 6 is 29, and 4 is 33, and 1 is 34, wherefore put down 4 under the place of Shillings, and carry *three Tens* to the place of *Tens of Shillings*, or *Angels*, and ſay, 3 that you carry and 1 is 4, and 1 is 5, and 1 is 6, and 1 is 7, and 1 is 8, and 1 is 9, and 1 is 10, and 1 is 11; now, 11 Angels, or 11 ten Shillings is 5 *l.* 10 *s.* or 5 *l.* 1 Angel,

gel, therefore place 1 Angel under the Angels, and it makes the 4 to be 14 *s.* which place under the place of Shillings, and carry 5 Pound to the place of Pounds, and finiſh the Work as before directed; and the Total Sum found will appear to be 1173 *l.* 14 *s.* 4 *d.* ¼.

Example II.

A Banker on the Ballance of his Books, finds himſelf indebted to L. 50l. 10s. 3d. ¼. *to* M. 100 l. 10 s. 10d. *to* N. 25l. 7s. 8d. ¾. *to* O. 59l. 17s. *to* P. 507l. 16s. 10d. ½. *to* Q. 7l. 14s. 9d. ¼. *to* R. 37s. *to* S. 25s. 11 d. ½. *to* T. 415l. 10s. 9d. *to* V. 76l. 13s. 9d. ½. *to* W. 100 l. *to* X. 15s. 11d. ½. *to* Y. 17l. 17s. *to* Z. 10l. 00s. 4d. ½.

	l.	*s.*	*d.*
L ———	50	10	3 ¼
M ———	100	10	10
N ———	25	7	8 ¾
O ———	59	17	0
P ———	507	16	10 ½
Q ———	7	14	9 ¼
R ———	1	17	0
S ———	1	5	11 ½
T ———	415	10	9
V ———	76	13	9 ½
W ———	100	00	0
X ———	00	15	11 ½
Y ———	17	17	0
Z ———	10	00	4 ½
Sum	1375	18	3 ¾

Firſt of all add up your Farthings, as before directed, and they make 15, which is 3 *d.* ¾. place ¾ under the Farthings, and carry 3 Pence to the Pence, and ſay, 3 and 4 is 7, and 11 is 18, and 9 is 27, and 9 is 36, and 11 is 47, and 9 is 56, and 10 is 66, *at which* 10 *make a Comma*, becauſe 66 *d.* is 5 *s.* 6 *d.* then proceed and carry 6 *d.* to the next Figure, which is 8, and ſay, 6 and 8 is 14, and 10 is 24, and 3 is 27. Now 27 *d.* is 2 *s.* 3 *d.* and the 5 *s.* before makes 7 *s.* 3 *d.* wherefore ſet down the 3 Pence under the place of Pence, and carry 7 Shillings, to the place of Shillings, and proceed to finiſh your Sum as was taught you in the laſt precedent, and the Total Sum will appear to be 1375 *l.* 18 *s.* 3 *d.* ¾.

Addition of Averdupois *Weight.*

Note, *That* 16 *Drams is an Ounce,* 16 *Ounces is a Pound,* 28 *Pound is a Quarter of an Hundred,* 4 *Quarters is an Hundred weight, conſiſting of* 112 *Pounds, and* 20 *Hundred is a Tun Averdupois weight.*

The Marks or Characters by which this weight is known or expreſſed are theſe, *viz. For Tuns (T.) Hundreds (C.) Quarters (Qr.) Pounds (lb.) Ounce (oz.) Drams (dr.)* As in the following Examples.

Tun.	*C.*	*qr.*	℔.	*C.*	*qr.*	℔.	*oz.*
25	14	2	24	154	1	19	10
57	16	3	25	275	3	19	11
42	10	1	17	476	2	10	07
96	14	2	27	57	3	14	08
54	17	2	18	45	1	10	10
59	16	3	22	17	2	22	11
75	14	2	19	45	3	17	09
64	17	3	26	76	2	19	14
478	04	0	10	1150	2	01	00

Let it be required to add up the Sum above, expreſſing *Tun. C. qr.* and ℔. Firſt, add up the Pounds by making a Speck or Tittle at every 28 you find in the place of Pounds, as you may ſee in the above-mentioned Example, where is found to be ſix ſpecks, and 10 ℔ over, which 10 place under the Denomination of Pounds, and carry 6 to the Quarters, and add them up, they make 24, which is 6 *C.* for which put a (0) under the place of *qrs.* and carry 6. C. to the place of *C.* Then proceed to add up your *C.* after the ſame manner, as you carry from Shillings to Pounds, becauſe 20 *C.* make a *Tun.* Laſtly, add up the *Tuns*, and the Total will appear to be 478 *Tun.* 04 *C* 0 *qr.* 10 ℔.

With *Troy Weight* are weighed Bread, Gold, Silver, and Electuaries. And with *Averdupois Weight* are weighed Butter, Cheeſe, Fleſh, Wax, Tallow, Pitch, Rozen, Lead, Iron, all ſorts of Grocery Wares, and all ſuch kind of garble whence there may iſſue a waſte.

The Pound *Averdupois*, containing 16 Ounces, is equal to 14 *oz.* 12 *pw. Troy Weight.* And the

Pound *Troy Weight*, conſiſting of 12 Ounces, is about 13 Ounces 2 Drams and a half of *Averdupois Weight*; ſo that he who tells you a Pound of Bread is as heavy as a Pound of Cheeſe is very much miſtaken, the one being a Pound *Troy*, and the other a Pound *Averdupois Weight*.

WOOL is alſo weighed with *Averdupois Weight*, but the Diviſions are ſomewhat different, *viz.* for Wool.

7 Pounds is a Clove, 2 Cloves is a Stone, 2 Stone is a Tood, 6 Toods 1 Stone, 12 Stone is a Wey, 2 Weys is a Sack, 12 Sacks is a Laſt of Wool.

Note, That according to the foregoing Diviſion, 182 lb. is a *Wey*, but in ſome Countries the *Wey* is 256 lb. *Averdupois*, as in *Suffolk*, &c. And in *Eſſex* there is 336 lb. in a *Wey*.

Addition of Apothecaries *Weights.*

Apothecaries Weights are the ſame in the main with *Troy Weight*, only the Subdiviſions of the Pound are different, as followeth, *viz.*

Note, *That* 20 *Grains is a Scruple,* 3 *Scruples is a Dram,* 8 *Drams is an Ounce, and* 12 *Ounces is a Pound Weight. The* Marks or Characters by which Apothecaries Weights are known are theſe, *viz. For Pounds* (lb.) *Ounces* (℥) *Drams* (ʒ) *Scruples* (℈) *and Grains (gr.)*

℔.	℥.	ʒ.	℈.	gr.
76	09	2	0	15
54	10	5	2	17
68	11	7	1	13
28	04	4	1	12
16	10	0	2	18
35	06	1	0	14
281	04	6	1	09

Addition of Troy *Weight.*

Note, *That* 24 *Grains is a Penny-weight,* 20 *Penny-weights is an Ounce, and* 12 *Ounces is a Pound Troy weight.*

The Notes or Characters by which *Troy weight* is known are theſe, *viz.* The Mark of Pounds is (℔.) of Ounces (*oz.*) of Penny-weights (*pw.*) of Grains (*gr.*)

Let it be required to add the following particulars together, *viz.* 24 ℔. 09 *oz.* 06 *pw.* 11 *gr.* and 164 ℔. 10 *oz.* 14 *pw.* 18 *gr.* and 82 ℔. 7 *oz.* 17 *pw.* 20 *gr.* and 8 ℔. 11 *oz.* 18 *pw.* 22 *gr.*

Now, in order to find out the Sum of theſe given quantities, I place them one under the other orderly, as you ſee in the Margent, and draw a Line under them. Then I begin with the Denomination of Grains, making a prick with the Pen at every 24 (for eaſe) and bear the overplus to the next above, ſaying, 22 and 20 is 42 which is 18 above 24, wherefore I make a Mark at 20, and carry the 18 up higher, ſaying 18 and 18 is 36, which is 12 above 24, wherefore I make a Mark at 18, and carry the 12 to the next above, ſaying, 12 and 11 make 23, which I put under the Line in its proper place, and obſerve how many Pricks I have made in the caſting up this Denomination, which I find to be 2, wherefore I carry 2 to the next, and proceed (as in the Shillings in *Addition of Money*, becauſe I carry one for every 20) ſaying, 2 and 8 is 10, and 7 is 17, and 4 is 21, and 6 is 27, and (then down again with the Tens) 10 is 37, and 10 is 47 and 10 is 57 Penny-weights, which is 2 *oz.* 17 *pw.* wherefore I put 17 *pw.* in its place under the Line, and carry the 2 *oz.* ſaying, 2 that I carry and 1 is 3, and 7 is 10, and 9 is 19, and 10 is 29, and 10 is 39 Ounces, which is 3 ℔. 3 *oz.* wherefore I put the 3 Ounces in its proper place under the Line, and carry the 3 ℔. to the Pounds, and proceed to finiſh the Work as before is directed, which being done, I find the total Sum to be 281 ℔. 3 *oz.* 17 *pw.* 23 *gr.* as in the Margent.

℔.	*oz.*	*pw.*	*gr.*
24	09	06	11
164	10	14	18
82	07	17	20
8	11	18	22
281	03	17	23

More Examples for Practice follow.

℔.	oz.	pw.	gr.	℔.	oz.	pw.	gr.
379	05	14	18	297	10	07	13
168	11	17	14	768	09	14	06
794	09	10	22	635	11	18	21
634	10	18	20	74	08	18	19
75	06	11	15	85	10	14	14
34	00	06	16	24	06	16	18
2087	09	09	09	1837	10	10	19

Addition of Liquid *Meaſure.*

The leaſt Denomination in Liquid Meaſure is a Pint, which was heretofore deduced from a Pound *Troy Weight*, a Pound of Wheat *Troy Weight* making a Pint Liquid Meaſure, but in regard of the Diſagreement thereof with the Rules of Solid Geometry in the gauging of Brewers Veſſels, ſome taking 288 ſolid Inches for a Gallon, ſome 286, &c. it occaſioned a difference between the Brewers and the Managers of his Majeſties Exciſe, till the Parliament taking the Matter into Conſideration, ordained that 282 ſolid Inches ſhould make the Gallon of Beer Meaſure, and the Gallon being ſubdivided into 2 Pottles, each Pottle into 2 Quarts, and each quart into 2 Pints, ſo that the Pint being the Eighth part of a Gallon, muſt contain 28 ſolid Inches and 7 eighth parts of an Inch for Wine Meaſure, and 35 ſolid Inches and a quarter for Beer Meaſure. *Wherefore note, that 35 ¼ ſolid Inches make a Pint Beer Meaſure, 2 Pints is a Quart, and 2 Quarts is a Pottle, 2 Pottles or 282 ſolid Inches a Gallon, 8 Gal-*

lons is a Firkin of Ale, 9 Gallons is a Firkin of Beer, and 2 Firkins is a Kilderkin, and 2 Kilderkins is a Barrel, 1 ½ Barrel, or 54 Gallons is a Hogſhead of Beer.

In Wine *Meaſures.*

2 Pints is a Quart, 2 Quarts is a Pottle, 2 Pottles is a Gallon, 42 Gallons is a Tearce, or Third part of a Pipe or Butt, 63 Gallons is a Hogſhead, 2 Hogſheads is a Pipe or Butt, and 2 Pipes or Butts is a Tun of Wine.

☞ Note, Honey and Oyl are meaſured by this Meaſure.

Examples of Wine *Meaſure.*

T.	*hhds.*	*gal,*	*pts.*	*T,*	*hhds,*	*gal,*	*pts.*
37 :	3 :	18 :	5	240 :	1 :	48 :	3
48 :	2 :	24 :	0	196 :	3 :	22 :	1
67 :	1 :	20 :	6	97 :	3 :	51 :	5
38 :	2 :	17 :	7	85 :	2 :	17 :	6
79 :	0 :	47 :	3	43 :	0 :	25 :	0
64 :	1 :	52 :	4	93 :	1 :	38 :	5
335 :	3 :	55 :	1	757 :	1 :	14 :	4

Addition of Dry *Meaſure.*

The leaſt Denominative part of dry Meaſure is a Pint, which is taken from *Troy Weight.*

With theſe are meaſured all dry Subſtances, as *Corn, Salt, Coal, Sand,* &c. The Table Followeth.

In Dry Meaſure, Note, that 2 *Pints make a Quart*, 2 *Quarts a Pottle*, 2 *Pottles a Gallon*, 2 *Gallons a Peck*, 4 *Pecks a Buſhel Land Meaſure*, 5 *Pecks a Buſhel Water Meaſure*, 8 *Buſhels a Quarter*, 4 *Quarters a Chalder, and* 5 *Quarters a Wey.*

Note, 36 *Buſhels is a Chaldron of Sea-Coal in* London.

Examples of Dry *Meaſure.*

Chald.	*qurs.*	*buſh.*	*pec.*
148	3	6	3
375	1	7	2
296	2	4	3
128	1	5	0
94	0	5	2
38	2	4	3
1082	1	2	1

Chald.	*qurs.*	*buſh.*	*pec.*
227	1	5	0
742	3	7	1
148	2	4	1
97	2	6	3
48	0	3	0
62	3	1	1
1327	2	3	2

Addition of Long *Meaſure.*

Long Meaſure is originally deduced from a Barley-Corn taken out of the middle of the Ear and well dried, from whence is deduced the following Table, *viz.*

In Long Meaſure, Note, that 3 *Barley-Corns make an Inch*, 12 *Inches a Foot*, 3 *Feet a Yard*, 3 *Feet* 9 *Inches, or a Yard and a Quarter, is an Ell* Engliſh, 6 *Feet a Fathom*, 5 *Yards and an half or* 16 *Feet and an half, make one Statute Pole, or Perch*, 30 *Poles or Perches make a Furlong, and* 8 *Furlongs make an* Engliſh *Mile*.

Examples

Examples of Long *Meaſure.*

Miles	*Fur.*	*Perch.*	*Miles*	*Fur.*	*Perches*
48	7	24	134	3	18
37	3	18	342	4	24
65	5	28	179	5	16
36	5	00	84	0	25
107	1	07	76	7	27
205	6	19	84	2	13
901	6	04	902	1	03

Addition of Cloth *Meaſure.*

Note, that 4 *Nails, or* 9 *Inches make a quarter of a Yard,* 3 *quarters of a Yard make an Ell* Flemiſh, 4 *quarters a Yard* Engliſh, 5 *quarters of a Yard, or* 45 *Inches is an Ell* Engliſh.

Examples of Cloth *Meaſure.*

yds.	*qrs.*	*na.*	*Ells*	*qrs.*	*na.*	*Ell. fl.*	*qrs.*	*na.*
137	3	3	376	2	0	184	1	2
295	1	2	178	3	3	357	2	1
112	2	3	742	3	1	475	2	2
215	0	1	97	2	2	251	1	0
174	1	2	84	1	2	164	0	2
764	3	0	68	0	3	87	1	3
1700	0	3	1547	3	3	1521	0	2

Addition of Land *Meaſure.*

From the foregoing Table of Long Meaſure, is alſo ſuperficial Meaſure deduced, that of Land Meaſure being as followeth, *viz.*

In Land Meaſure, 40 ſquare Poles or Perches make a Rood, and 4 Roods make an Acre.

Examples of Land *Meaſure.*

Acr.	Rood.	Per.	*Acr.*	Rood.	Per.	*Acr.*	Rood.	Per.
120	2	34	164	1	20	320	3	10
275	3	14	130	3	25	180	1	19
162	1	35	644	2	17	672	3	28
98	2	20	563	0	24	191	0	12
47	3	30	372	3	18	634	1	15
64	1	15	140	1	26	87	2	14
769	3	28	2016	1	10	2087	0	18

Of Time.

The Denominative parts of Time are originally deduced from the Sun's Motion in the Heavens, which is carried round the ſame from *Eaſt* to *Weſt* by the Rapid Motion of the *Primum Mobile* in one Day Natural, which Day is divided into 24 ſuppoſed equal parts, called Hours, and each Hour is ſubdivided into 60 Minutes, *&c.* whence ariſeth the following Table, *viz.*

In *Time*, Note, That 60 *Minutes make an Hour*, 24 *Hours make a Natural Day*, 7 *Days make a Week*, 4 *Weeks make a Month, conſiſting of* 28 *Days*, 13 *Months* 1 *Day and* 6 *Hours make a Year.*

However, in the ordinary Computation of Time, the Year is divided into 12 unequal Calender Months, whoſe Names, and the Numbers of Days that each containeth, are as followeth, *viz.*

	Days.		Days.
January	31	*July*	31
February	28	*Auguſt*	31
March	31	*September*	30
April	30	*October*	31
May	31	*November*	30
June	30	*December*	31

Note, That the 6 odd Hours is reckoned but once in 4 Years, and the one whole Day is added to that Year, making it to conſiſt of 366 days, and is called *Leap-Year*; the ſaid Day is added to *February*, which then containeth 29 Days.

Note alſo, *That the Minute is uſually ſubdivided into 60 Seconds, and each Second into* 60 *Thirds*, &c.

The Tropical Year, or the time the Sun leaves the Tropick, till the time it returns to it again; by the Obſervations of the moſt Accurate Aſtronomers, is found to conſiſt of 365 *Days*, 5 *Hours*, 49 *Minutes*, 4 *Seconds*, and 21 *Thirds*.

CHAP. III.

Of SUBTRACTION.

I. SUBTRACTION *Teacheth to take a leſs Number from a greater, or an equal from an equal; whereby we diſcover the* Remainder Exceſs, *or* Difference.

II. *In Subtraction*, if the Numbers given be Integers, that is, conſiſting of one Denomination, then place the biggeſt Number uppermoſt, and the leſſer in order under it, *viz.* Units under Units, Tens under Tens, Hundreds under Hundreds, &c. And draw a Line under them.

III. Then begin at the place of Units, taking the lowermoſt Figure out of the uppermoſt, and place the Remainder under the Line, then proceed to the place of Tens, and do in the ſame manner, and then to the place of Hundreds, &c. till the whole Work be finiſhed: Then ſhall the Number under the ſaid Line be the Remainder or Difference.

Example.

Let it be required to find the difference between 48 *and* 16?

Firſt, I put down the biggeſt Number, 48, and place 16 the leſſer Number under it, and under both I draw a Line, as you ſee in the Margent; then I begin at the place of Units, ſaying, 6 out of 8 and there remains 2, which I place under the Line, and proceed to the next place, ſaying, 1 from 4 and there remains 3, which I likewiſe place under the Line, and the Work is finiſhed. So that I find the remainder or difference between 48 and 16 to be 32, as you may ſee by the Work in the Margent.

$$\begin{array}{r} 48 \\ 16 \\ \hline 32 \end{array}$$

More Examples of the like Nature follow.

From	743	586	3785	1842
Subtr.	121	270	205	342
Remains	622	316	3580	1500

But if the particular Figure which you are to *Subtract*, be greater than the Figure out of which it is to be *Subtracted*; then you are to borrow 10, and add it to the uppermoſt Figure, and then *Subtract* the ſaid lowermoſt Figure, from their Sum, and place the *Remainder* underneath the Line, and for that which you borrowed, add 1 to the next Figure in the lowermoſt Line, and proceed. Let this be repeated as often as there is occaſion.

Example.

Let it be required to Subtract 3872 *from* 43758.

The given Numbers being placed, and a Line drawn under them, as is before directed, I begin at the right hand, ſaying, 2 from 8, and there remains 6, which I ſet under the Line, and proceed, ſaying, 7 from 5 I cannot, but 7 from 15 and there remains 8, which I put under the Line, and proceed to the next, ſaying, 1 that I borrow'd and 8 is 9 from 7 I cannot, but 9 from 17 and there remains 8, which I put under the Line, and proceed to the next Figure, ſaying, 1 that I borrowed and 3 is 4, from 3 I cannot, but 4 from 13 and there remains 9, which I put under the Line; now becauſe there is no Figure ſtand-

```
 43758
  3872
 -----
 39886
```

ſtanding under the 4, I therefore ſuppoſe a (o) Cypher to be placed there, and becauſe I borrowed 1 at the laſt Figure, therefore I pay it here by Subtracting it out of the 4, ſaying, 1 that I borrowed out of 4 and there remains 3, which I put under the Line, and the Work is finiſhed; and I find (after the Work of Subtraction is ended) the remainder to be 39886. Theſe Examples being well underſtood, will render what follows to be plain and eaſie.

From	7458	50876	10008576
Subtr.	467	947	8743
Remains	6991	49929	9999833
From	5100	30210	15764
Take	1754	10325	7276
Reſt	3346	19885	8488
Proof	5100	30210	15764

The Proof of Subtraction.

For Proof of Subtraction, add the reſt, or Remainder, to the Number Subtracted, and if the Sum be equal to the uppermoſt Number (*being the Number from whence Subtraction is made*) your Work is true, otherwiſe falſe, as you may ſee in the laſt Example of Subtraction above mentioned.

Subtraction of Money.

IV. If the given Numbers conſiſt of divers Denominations, ſuch as *Money, Weight, Meaſure, Time*, &c. Then you are to place the leſſer Number under the greater, in ſuch ſort that each Denomination may ſtand under its correſpondent Name, as has been directed in *Addition*, and draw a Line under them.

Then proceed to Subtract the undermoſt from the uppermoſt, beginning at the leaſt Denomination, and proceeding gradually towards the left hand, ſetting the *Remainder* of each Denomination under the Line until the whole be finiſhed: As for Example.

Let it be required to Subtract 126 *l.* 07 *s.* 04 *d.* $\frac{1}{4}$. from 254 *l.* 13 *s.* 10 *d.* $\frac{3}{4}$. Firſt, I place them down, the leſſer under the greater, and draw a Line under them, as you ſee in the Margent.

Then I begin at the right hand ſaying, 1 Farthing from 3 Farthings and there remains 2, which I put under the Line in the Place of Farthings, and proceed to the Denomination of Pence, ſaying, 4 from 10 and there remains 6, which I put under the Line in the place of Pence, and then I go to the Denomination of Shillings, ſaying, 7 from 13 and there reſts 6, which I put under the Line in the place of Shillings, and then I proceed to finiſh the Work according to the third Rule of this Chapter; which being ended, I find the remainder to be 128 *l.* 06 *s.* 06 *d.* $\frac{1}{2}$. as you ſee in the Margent.

l.	*s.*	*d.*
254	13	10 $\frac{3}{4}$
129	07	04 $\frac{1}{4}$
128	06	06 $\frac{1}{2}$

V. But if the lowermoſt Number in any of the Denominations chance to be greater than the uppermoſt, you muſt in ſuch caſe borrow an Unit from the next greater Denomination, ſubtracting the lowermoſt Number there from, and *adding the Remainder* to the ſaid uppermoſt Number, and place that Sum under the Line; and then proceed, adding one to the next lowermoſt Number to the left hand for that you borrowed, *&c.*

A few examples will make this Rule very plain.

l.	*s.*	*d.*
348	12	07 $\frac{3}{4}$
178	15	09 $\frac{1}{4}$
[illegible]	16	10 $\frac{1}{2}$

Let it be required to ſubtract 178 *l.* 15 *s.* 9 *d.* $\frac{1}{4}$. from 348 *l.* 12 *s.* 7 *d.* $\frac{3}{4}$. Firſt, I place them down in order, as has been before directed, and draw a Line under them. Then I begin at the right hand with the Denomination of Farthings, ſaying, 1 from 3 and there remains 2, which I put under the Line, and proceed to the Denomination of Pence, ſaying, 9 Pence out of 7 Pence I cannot, but (borrowing one from the next Denomination, which is Shillings, and makes 12 Pence, I ſay) 9 from 12 and there remains 3, which I add to the 7 Pence and that makes 10 Pence; wherefore I put 10 Pence under the Line, and proceed to the next Denomination, which is Shillings, and ſay, 1 that I borrowed and 15 is 16 from 12 I cannot, but (borrowing 1 Pound from the next Denomination, which is 20 Shillings) 16 from 20 and there remains 4; which added to the ſaid 12 makes 16 Shillings, which I ſet down under the Line, and proceed to the Pounds, ſaying, 1 that I borrowed and 8 is 9 from 8 I cannot, but 9 from 18, *&c.* And the Work being finiſhed, I find the Remainder to be 169 *l.* 16 *s.* 10 *d.* $\frac{1}{2}$. as appears by the Work in the Margent.

Exam-

Examples for Practice.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*
Received	295	11	03 ¼	415	00	05 ½
Paid	107	14	09 ½	107	11	08 ¾
Reſt	178	16	05 ¾	307	08	08 ¾
Proof	295	11	03 ¼	415	00	05 ½
Debtor	100	00	00	1072	01	05
Creditor	75	00	09	107	16	10 ½
Ballance	24	19	03	964	04	06 ½
Proof	100	00	00	1072	01	05
Received	1010	10	10	100	00	09 ½
Diſburſt	942	13	11 ½	47	00	10
Reſt	67	16	10 ½	52	19	11 ½
Proof	1010	10	10	100	00	09 ½

VI. If a Sum be lent, and Payment thereof made at ſeveral times in part, and you would know how much remains due, in this caſe you muſt add the ſeveral Payments into one Sum, and ſubtract that Sum from the Sum lent, and the Remainder will ſhew how much is due. An Example or two will make it plain and eaſie.

Lent

	l.	s.	d.	l.	s.	d.
Lent	3475	10	05	572	11	05
Paid at ſeveral times	358	14	07 ½	154	09	07 ¼
	514	07	11 ¼	95	10	07
	294	16	09	6	14	05 ¾
	344	10	08 ½	72	11	04
	365	15	10 ¼	16	17	02
	725	15	07 ¼	9	14	11 ¾
	462	14	08	164	17	09
Paid in all	3136	16	02 ¼	520	15	10 ¾
Reſt due	338	14	02 ¾	51	15	06 ¼
Proof	3475	10	05	572	11	05

Examples.

	l.	s.	d.
Lent	4768	17	10 ¼
Received at ſeveral times	347	14	06 ½
	785	11	11 ¾
	128	15	09 ¼
	420	16	05
	124	00	02 ¾
Received in all	1806	18	11 ¼
Remains due	2961	18	11

Bor-

	l.	s.	d.	l.	s.	d.
Borrowed	3475	10	05	4620	00	00
Paid at ſeveral times	358	14	07 ½	409	09	10
	514	07	11 ¾	276	15	07 ¼
	294	16	09	195	13	11 ¾
	344	10	08 ½	167	19	12 ½
	365	15	10 ¼	984	19	05 ¾
	792	05	06 ½	785	07	06
Paid in all	2670	11	05 ½	2820	03	02 ¼
Reſts due	804	18	11 ½	1799	16	09 ¾
Proof	3475	10	05	6420	00	00

Let us prove the Example of the Fifth Rule in Subtraction of Money, where it is required to Subtract 178 *l.* 15 *s.* 9 *d.* ¼. from 348 *l.* 12 *s.* 7 *d.* ¾.

	l.	s.	d.
From	348	12	07 ¾
Subtr.	178	15	09 ¼
Remain	169	16	10 ½
Proof	348	12	07 ¾

In this Example the Remainder is found to be 169 *l.* 16 *s.* 10 *d.* ½. which I add to 178 *l.* 15 *s.* 9 *d.* ¼. (the Number given to be ſubtracted) and the Sum is 348 *l.* 12 *s.* 7 *d.* ¾. which is equal to the uppermoſt of the given Numbers, wherefore I conclude the Subtraction to be truly wrought.

Subtraction of Averdupois *Weight*.

A *Salter* buys 45 Tun, 7. C. 1 qr. 12 lb. of *Logwood, of which he* ſold 19 Tun, 14. C. 1 qu. 18 lb.

In order to the Work, I diſpoſe of the given Numbers according to the Directions of the Fourth Rule of this Chapter, drawing a Line under them, as you ſee in the Example.

Tun.	*C.*	*qr.*	lb.
45	97	1	12
19	14	1	18
25	12	3	22

Then I begin at the right hand, which is pound weights, ſaying, 18 out of 12 I cannot, but 18 out of 28 (borrowing 2 *qu.* of a *C.* (*which is* 28 lb.) and there remains 10, to which add the 12 lb. it makes 22 lb. which I place under the lb, and carry 1 to the quarters, and ſay, 1 that I borrowed and 1 is 2, now 2 quarters, out of 1 I cannot, but 2 out of 4 quarters (*which is a* C. *weight*) there remains 2, to which add the 1 quarter, it makes 3, which I place under the qrs. and proceed to the *C.* and ſay, 1 that I borrowed and 14 *C.* is 15 *C.* now 15 *C.* out of 7 *C.* I cannot, but 15 *C.* out of 20 *C* (*which is* a *Tun*) there remains 5, to which add the 7 *C.* it makes 12 *C.* which I place under the *C.* and proceed to the Tuns, and ſay, 1 that I carried and 9 is 10, 10 out of 5 I cannot, but 10 out of 15 reſt 5, and carry 1, and ſay, 1 that I carry and 1 is 2, out of 4 and there remains 2, and the Work is finiſhed, and I find the *Remainder* or *Difference* to be 25 *Tun*, 12 *C.* 3 *qrs.* 22 lb.

More Examples for the Learners Practice.

	Tun.	*C.*	*qr.*	lb.	*C.*	*qr.*	lb.
Bought	107	10	2	05	74	0	15
Sold	94	17	3	10	19	1	11
Reſt	12	12	2	23	54	3	04
Proof	107	10	2	05	74	0	15

	C.	*qrs.*	lb.	*C.*	*qrs.*	lb.
Bought	194	3	27	454	1	17
Sold	99	2	16	196	3	22
Unſold	95	1	11	257	1	23
Proof	194	3	27	454	1	17

If ſeveral Quantities in *Groſs Weight* be given, out of which you would Subtract the *Tare*, in ſuch a caſe add the Groſs Weight into one Total:

And add the Tare likewiſe into one Total. Then Subtract the Total of the *Tare* from the Total of the *Groſs*, the Remainder is *Neat* weight.

Example.

A Merchant ſells 6 Hogſheads of Sugar, viz.

	C.	qrs.	lb.		C.	qrs.	lb.
Nº 1 Gr.	14	2	10	Tare	1	3	15
2 ——	17	1	19		2	0	05
3 ——	16	2	14		2	1	10
4 ——	17	1	10		2	1	16
5 ——	18	2	17		2	1	12
6 ——	14	1	22		1	3	22
Groſs	99	0	08	Tare	12	3	24
Tare	12	3	24				
Reſt Neat	86	0	12				

Subtraction of Troy *Weight.*

	oz.	pw.	gr.	oz.	pw.	gr.
Bought	115	07	05	976	11	06
Sold	94	13	10	149	14	11
Reſt	20	13	19	826	16	19
Proof	115	07	05	976	11	06

	℔.	oz.	pw.	℔.	oz.	pw.	gr.
Bought	375 :	05 :	13 ½	194 :	3 :	09 :	16
Sold	196 :	10 :	17 ¼	95 :	7 :	14 :	18
Reſt	178 :	06 :	16 ¼	98 :	7 :	14 :	22
Proof	375 :	05 :	13 ½	194 :	3 :	09 :	16

I might proceed to give Examples in Subtraction of Liquid Meaſure, Dry Meaſure, Long Meaſure, Apothecaries Weights, Time, Motion, *&c.* but there being no more difference between the working of theſe and thoſe Examples, than only obſerving the Tables of each, which are delivered in the ſecond Chapter, therefore I forbear, this being ſufficient for the meaneſt Capacity.

CHAP. IV.

Of MULTIPLICATION.

I. IN *Multiplication* there are always two Numbers given to find out a third, which ſhall contain either of the given Numbers as many times as the other containeth an Unit.

II. Of the two Numbers given, the one is called the *Multiplicand,* and the other is called the *Multiplier,* and the Number found out by the Operation is called the *Product.*

III. The *Multiplicand* is the Number given to be Multiplied, and is uſually, for orders ſake, the biggeſt of the two given Numbers.

IV. The *Multiplier* is that by which the *Multiplicand* is Multiplied, and is uſually the leaſt Number.

V. The *Product* is the Number produced by the Multiplication, and it containeth the *Multiplier* as many times as the *Multiplicand* containeth Units; or it containeth the *Multiplicand* as often as the *Multiplier* containeth Units.

VI. *Multiplication* is either Simple or Compound.

VII. *Simple Multiplication* is when the Multiplicand and the Multiplier, do each of them conſiſt of one ſingle figure only: As if it were required to multiply 4 by 3, 5 by 2, 9 by 7, &c. Here 3 times 4 is 12, and 2 times 5 is 10, and 7 times 9 is 63; now 12, 10 and 63, are the *Products* of each Multiplication.

VIII. All the variety of *Simple Multiplication* is contained in the following Table, which muſt be learned by heart, before the Learner can make any further Progreſs.

Multiplication T A B L E.

2 times	2	is	4
	3		6
	4		8
	5		10
	6		12
	7		14
	8		16
	9		18
	10		20
	11		22
	12		24

3 times	3	is	9
	4		12
	5		15
	6		18
	7		21
	8		24
	9		27
	10		30
	11		33
	12		36

4 times	4	is	16
	5		20
	6		24
	7		28
	8		32
	9		36
	10		40
	11		44
	12		48

5 times	5	is	25
	6		30
	7		35
	8		40
	9		45
	10		50
	11		55
	12		60

6 times	6	is	36
	7		42
	8		48
	9		54
	10		60
	11		66
	12		72

7 times	7	is	49
	8		56
	9		63
	10		70
	11		77
	12		84

8 times	8	is	64
	9		72
	10		80
	11		88
	12		96

9 times	9	is	81
	10		90
	11		99
	12		108

IX. *Compound Multiplication* is when the *Multiplicand*, or *Multiplier*, or both of them, do conſiſt of *Compound Numbers*, that is, of more Figures or Places than one.

As if it were required to Multiply 324 by 2, here the *Multiplicand* is 324, which conſiſteth of 3 places, and the *Multiplier* is 2.

X. When it is required to Multiply one Number by another, firſt ſet down the biggeſt Number for the Multiplicand, and under that the *Multiplier* in ſuch order as has been taught in Addition and Subtraction, *viz.* Units under Units, Tens under Tens, *&c.* and draw a Line under them.

As if it were required to Multiply 324 by 2, I ſet them down as followeth, *viz.*

The Multiplicand	324
The Multiplier	2

Then I begin with the place of Units, ſaying, 2 times 4 is 8, which I put under the Line; then 2 times 2 is 4, which I alſo put under the Line; and 2 times 3 is 6, which I alſo put under the Line; and the Work is finiſhed: So that I find 324 being Multiplied by 2, produceth 648. as by the following Work.

The Multiplicand	324
The Multiplier	2
The Product	648

XI. When the Product of any ſingle Figure amounts to 10, or a certain number of Tens, then you are to ſet down a Cypher, and carry an Unit for every Ten to the Product of the next Figure; or if it comes to above 10, or any number of Tens, then ſet down the exceſs, and carry an Unit for every Ten, *&c.* as in the following Example.

Let it be required to Multiply 785641 by 5.

The Number being ſet down according to the Tenth Rule, I begin, ſaying, 5 times 1 is 5, which I put under the Line, and proceed, ſaying, 5 times 4 is 20, wherefore I put down 0, and carry 2 for the 2 Tens to the next, ſaying; 5 times 6 is 30, and 2 that I carried is 32, wherefore I put down 2 and carry 3 from the 3 Tens to the next Figure, ſaying, 5 times 5 is 25, and 3 that I carried is 28, wherefore I put down 8, and carry 2 to the next, ſaying, 5 times 8 is 40, and 2 that I carry is 42, ſo I put down 2, and carry 4 to the next Figure, ſaying, 5 times 7 is 35, and 4 that I carry is 39, which being the laſt Figure, I put down 39 under the Line, and ſo the Work is finiſhed, and I find that 785641 being Multiplied by 5 the Product, is 3928205, as appears by the whole Work in the Margent.

785641
5
3928205

And here by the way, Note, *That Multiplication is a Compendious Performance of Addition*, for in the laſt Example, if inſtead of Multiplying 785641 by 5, I put down the Multiplicand 5 times in order one under the other, and add them altogether, then will the Sum of them amount to the Product that was found by the foregoing Work of Multiplication, as appears by the Work in the Margent. The ſame may be performed by any other Example.

785641
785641
785641
785641
785641
3928205

Other Examples for this Rule for Practice may be ſuch as follow.

748046	570084	7115083
4	6	8
2992184	3420504	56920664
72190	35726	145796
9	5	10
649710	178630	1457960

XII. When the *Multiplier* conſiſts of divers places, then muſt there be as many *particular Products* as there are places therein, and for the true placing of each Product, obſerve to put the firſt Figure or place of Units under its proper *Multiplier*, and when you have done, draw a Line under the whole Work, and add the *ſeveral Products* together, and their Sum will be the total Product required.

Example I.

Let it be required to Multiply 46753 *by* 46.

```
 46753
    46
-------
 280518
187012
-------
2150638
```

Having placed the given Numbers in order to the Work, according to the Tenth Rule of this Chapter, and draw a Line under them, as you ſee in the Margent, I begin to Multiply with the 6, ſaying, 6 times 3 is 18, wherefore I put down 8 under the Line, and carry 1 to the next, ſaying, 6 times 5 is 30, and 1 that I carry is 31, &c. ſo that the Product by 6 is 280518. Then I begin with the 4, ſaying, 4 times 3 is 12, wherefore I put down 2 (under the Line, and under the Figure 4 by which I Multiply) and carry 1 for the Ten to the next, ſaying 4 times 5 is 20, and 1 that I carry is 21; wherefore I ſet down 1, and carry 2 to the next, *&c.* and I find the ſingle Product by 4 to be 187012, and ſo the Multiplication is ended: Then I draw a Line under theſe two particular Products, and add them together in the order as they ſtand, and the Sum is 2150638, which is the true Product of 46753 being Multiplied by 46, that is, 46 times 46753, is 2150638, and is equal to the Sum of 46753, being ſet 46 times one under another and added together. Behold the whole Work of Multiplication in the Margent.

Example II.

Let it be required to Multiply 5800846 by 478.

Firſt, I diſpoſe of the given Numbers in order to the Operation, according to the tenth Rule foregoing.

Then I begin and Multiply the whole *Multiplicand* by (the firſt Figure of the *Multiplier*) 8, and the Product thereof is 46406768; then I Multiply the ſame again (by the ſecond Figure of the Multiplier) 7, and the Product thereof is 40605922, the firſt Figure whereof *viz.* 2. I place under the 7, by which I Multiply. Then I proceed to Multiply by 4, and the Product thence ariſing is 23203384; the firſt Figure whereof, which is 4 I place under 4, by which I Multiply, and all the reſt in their order, and ſo the

```
   5800846
       478
  --------
  46406768
 40605922
23203384
----------
2772804388
```

whole Work of Multiplication is finiſhed: Then I draw a Line under all, and add up the ſeveral Products, and their Sum is 2772804388, which is the total Product.

A General Rule in Multiplication, is chiefly to obſerve, That in whatſoever place the Figure of the Multiplier (whether a Cypher or Cyphers) ſtands from the place of Units, in the ſame place muſt the firſt Figure of that Multiplication be ſet from the Unit of the Multiplicand.

And ſince the greateſt Difficulty in Multiplication ariſes from having a Cypher or Cyphers in the Multipliers, I ſhall endeavour to make it plain and eaſie by the following Examples.

Example I.

Where there is one or more Cyphers in the Multiplier betwixt ſignificant Figures.

```
     (2)                 (1)
    45793             8465008
      507                4006
  --------         -----------
    320551           50790048
   2289650         3386003200
  --------         -----------
  23217051        33910822048
```

In the firſt Example you ſee that the Cyphers are put at the ſame diſtance from the Unit of the Multiplicand that they ſtand in from the Unit of the Multiplier; as 4, the Fourth Figure of the Multiplier (the firſt Figure in that Multiplication, which is 2) is ſet in the Fourth place from the Unit of the Multiplicand.

Example

Example II.

Where the Multiplier hath one or more Cyphers the right hand thereof.

(1)
546735
4620

10934700
3280410
2186940

2525915700

(2)
7645932
48000

61167456
30583728

367064736000

Or, *You may Multiply by the ſignificant Figur* neglecting the Cyphers *(as in the ſecond Sum) as there were none, only to the Product annexed as ma Cyphers as there were Cyphers in the Multiplier.*

Example III.

Where the *Multiplicand* and *Multiplier* have ea of them Cyphers at the right hand.

(1)
58400
760

3504000
408800

44384000

(2)
438700
67000

30709
26322

29392900000

Or, *You may* neglect the Cyphers *(as in the ſeco Sum) only to the Product annex as many Cyphers there were Cyphers to the right hand of the Multiplica and Multiplier.*

XIII. When the *Multiplier* conſiſts of a Unit in the higheſt place towards the left hand, and all the reſt Cyphers towards the right hand, as 10, 100, 1000, &c. then is the whole Work performed by annexing the Cyphers of the Multiplier to the Figures of the Multiplicand; as in the following Examples.

6507	6507	6507
1000	100	10
6507000	650700	65070

XIV. *It is neceſſary for all ſuch as would be dextrous and ready at Arithmetick, to learn to Multiply by theſe compound Numbers following very readily at one Operation,* viz.

Ex. Mult.	574967	Mult.	842958
by	11	by	12
fa.	6324637	*fa.*	10115496
	345786		859429
	110		120
Product	38036460	*fa.*	103131240
	7504675		3217295
	12		12
	90056100		38607540

Here 574967 is Multiplied by 11 thus, 11 times 7 is 77, put down 7, and carry 7, and then 11 times 6 is 66, and 7 I carry is 73, put down 3, and carry 7, then 11 times 9 is 99, and 7 I carry is 106, put down 6, and carry 10, then 11 times 4 is 44, and 10 I carry is 54, put down 4 and carry 5, then 11 times 7 is 77, and 5 is 82, put down 2, and carry 8, then 11 times 5 is 55, and 8 I carry is 63, which put down to the Product of 574967 multiplied by 11 is found to be 6324637.

In like manner to multiply 842958 by 12, ſay, times 8 is 96, put down 6, and carry 9, then 12 times 5 is 60, and 9 I carry is 69, put down 9 and carry 6, and ſo proceed till you have gone through your Sum.

To Multiply any Number by 110, or 120, put down a Cypher, and Multiply as before.

Multiply	423760	Multiply	543760
by	1200	by	1200
Product	466136000	*fa.*	652512000

The Proof of Multiplication.

XV. When you would prove the Truth of your Work in Multiplication, firſt, with your Pen make a Croſs, then add the Figures of the Multiplicand together, not conſidering their value as to the places they poſſeſs, but as if they were all Units, caſting away the Nines as often as may be, and put the laſt Remainder on the left ſide of the Croſs made for that purpoſe, then likewiſe add the Figures in the *Multiplier* together, caſting away the Nines as often as may be, and put the laſt Remainder on the right ſide of the Croſs; then multiply theſe two Remainders one by another,

ther, and caſt away all the Nines out of their Product, and put their remainder above the Croſs; then add together the Figures of the Product, caſting away the Nines as often as may be, and put the laſt Remainder under the Croſs, and then look if the Figure above the Croſs, and the Figure below the Croſs be equal, then is your Sum rightly performed, otherwiſe not.

As for example: Let it be required to multiply 587464 by 465; when the Work is finiſhed, I find the Product to be 273170760, as by the following Work appears.

```
      6              587464
    7 + 6               465
      6             -------
                    2937320
                   3524784
                  2349856
                  ---------
                  273170760
```

Now to prove whether the Work be rightly perform'd, I firſt make a Croſs as you ſee above, and then begin to add the Figures of the *Multiplicand* together, ſaying, 5 and 8 is 13, caſt away 9 and there reſts 4; then 4 and 7 is 11, caſt away 9 and there reſt 2; then 2 and 4 is 6, and 6 is 12, caſt away 9 and there remains 3; then 3 and 4 is 7, which I put down on the left ſide of the Croſs: then I add together the Figures of the *Multiplier*, as I did thoſe of the *Multiplicand*, and the laſt Remainder there is 6, which I put on the right ſide of the Croſs; then do I multiply theſe two Figures together which ſtand on each ſide of the Croſs, *viz.* 6 and 7, and their Product is 42, out of which I caſt the Nines as often as may be, and there remains 6, which I put on the top of the Croſs. But the eaſieſt way to caſt the Nines out of any Number, is to add the Figures together which conſtitute that Number, and their Sum is the Remainder when the Nines are caſt away as often as may be, ſo in this Example the Nines are eaſily caſt out of 42 (which is the Product of 6 by 7) for 42 is conſtituted of 4 and 2, whoſe Sum is 6; but if the ſaid Sum chance to come to more than 9, caſt 9 out of it, and put down the Remainder, ſo 8 times 7 is 56, the Sum of which Figures (5 and 6) is 11, out of which taking 9 there reſts 2, which is the true Remainder when the Nines are caſt out of 56 as often as may be.

Now in this Example, having put the ſaid Remainder, 6 above the Croſs, I proceed to caſt away the Nine out of the Product, and there remains 6 likewiſe, which I put below the Croſs, and becauſe the Figure above and below the Croſs are equal, *viz.* each 6, I conclude the Work to be truly performed.

But the true Proof of *Multiplication* is by *Diviſion*, as ſhall be taught in that Rule, this way by caſting away the Nines many times proving the Work to be true, when it is abſolutely falſe, but when it proveth not true this way, the Sum cannot be right.

CHAP. V.

Of DIVISION.

D*IVISION Teacheth to Divide any given Number into as many equal parts as you pleaſe.* Or, It is that by which we diſcover how often one Number is contained in another.

II. In *Diviſion* there are always 3 Numbers *certain*, and a fourth *accidental*.

III. Of the 3 Numbers certain two are always given to find out a Third, *viz.* The one of the Numbers given is to be *Divided*, the other Number given is that by which the firſt is *Divided*, and the Number found out is the *Quotient*, and diſcovers how often the one Number is contained in the other.

IV. Therefore in this Rule are three remarkable Numbers, *viz.* The *Dividend*, the *Diviſor*, and the *Quotient*.

(1) The *Dividend* is the Number given to be divided into equal parts.

(2) The *Diviſor* is the Number given by which the *Dividend* is to be divided, which declareth into how many equal parts the *Dividend* is to be divided.

(3) The *Quotient* is the Number *Invented* by the Operation, and ſhews *how often* the *Diviſor* is contained in the *Dividend*.

And the *Remainder* is the Number which remains after the *Diviſion* is ended, which is uncertain, and is the Fourth accidental Number, I mentioned before.

As ſuppoſe 15 were given to be divided by 3, or 15 Shillings to be divided amongſt 3 Men, here 15 is the *Dividend*, 3 is the *Diviſor*, and 5 is the *Quotient*, for 3 is contained in 15 juſt 5 times, without any Remainder; but if you were to divide 20 by 3, the *Quotient* would be 6, and the *Remainder* 2, for 3 is contained in 20, 6 times, and 2 remains over.

In *Diviſion* (*by one Figure*) you are firſt to write down the *Dividend*, and then draw a crooked Line, and place the *Diviſor* on the left hand thereof, then draw a Line under the *Dividend*, under which place your *Quotient*.

Example.

Let it be required to Divide 45 by 9, here the *Quotient* is 5, becauſe 9 is contained in 45, 5 times, and theſe ought to be placed as followeth.

Dividend
Diviſor 9) 45
Quotient 5

V: When a Number is given to be divided by a *ſingle* Figure or Digit, if the firſt Figure of the *Dividend*, viz. (*that on the left hand*) be bigger, or at leaſt equal to the *Diviſor*, you are to put a Point or Prick under the ſame, and then proceed as followeth,

Example.

Suppoſe it were required to divide 6788 by 4, the given Numbers are placed as before directed, making a Prick under (6) the firſt Figure of the *Dividend*, which for diſtinction ſake may be called the *Dividual*, as followeth.

Dividend
Diviſor 4) 6788
———
Quotient 1697

Note, In every *Diviſion* you are to obſerve this Method; firſt, to *Seek*, ſecondly, to *Multiply*, thirdly, to *Subtract*.

As in the laſt Example, after you have writ down your *Dividend* and *Diviſor*, as was ſhewed you, firſt, ſeek how often (or how many times) 4, which is the *Diviſor*, can you have in 6, which is the firſt Figure of the *Dividend* towards the left hand, the Anſwer is once; which I place in the *Quotient* exactly under the 6 (as you ſee in the Operation of the Sum) and ſay, once 4 out of 6, there will remain 2, which 2 is two Tens to the next Figure 7, and makes the new *Dividual* 27. Then aſk again (*or ſeek*) how often 4, the *Diviſor*, can you have in 27, *Anſwer*, 6 times, which 6 place in the *Quotient* under 7, the ſecond Figure of the *Dividend*, then take 6 times 4 which is 24 out of 27, there will remain 3, which is three Tens to 8, the third Figure of the Dividend, and makes it 38. Then *aſk* again, how many times 4 can you have in 38? Anſwer 9 times; which 9 place in the Quotient under 8, the third Figure of the Dividen; then take 4 times 9, which is 36, out of 38, there will remain 2, which is two Tens to the fourth and laſt Figure of the Dividend, and makes the 8 to be 28. Then *Laſtly*, ſeek how often the Diviſor 4 can you have in 28; Anſwer, 7 times, which I place under 8 the laſt Figure of the Dividend, and your Work is done; the Quotient being found to be 1697, which is the Number of times the Diviſor 4 is found in the Dividend 6788. Or if the ſaid Sum were to be divided between 4 Men, each Man's Share would be 1697 Pounds.

But to make this plain to any ordinary Capacity, I ſhall take the Dividend into pieces, to ſhew the four ſeveral Operations of the laſt Sum, and then give you ſome Examples for your Practice therein.

Dividend
Diviſor 4) 6788
——— 4) 6 27 38 28
Quotient 1697 — — — —
1 6 9 7

If you take 1 time 4 out of 6, there will remain 2 to the ſecond Figure 7, which makes it 27; then 4 in 27, there will be 6 times, and 3 will remain to the third Figure 8, which makes it 38; then 4 in 38, there will be 9 times, and 2 will remain to the fourth Figure, which is 8, and makes it 28; then 4 in 28, is 7 times, which place under 8, the laſt of your *Dividend*, and your Quotient will be 1697.

Examples for the Learners Practice.

(1)	(2)	(3)
5) 712640	6) 721494	7) 42165
142528	120249	6023$\frac{4}{7}$

VI. *If you cannot take the Diviſor out of the Dividend*, as in the ſecond Example, then are you to put a Cypher in the Quotient, and reckon that Figure as ſo many Tens to the next, as before was ſhewed you in the laſt Rule.

Example.

6) 721494

120249

Say, 6 in 7 once, reſt 1, which makes the 2, 12; then 6 in 12, 2 times; then 6 in 1, 0 times, reſt 1, which makes the 4, 14; then 6 in 14, 2 times, reſt 2, which makes the 9, 29; then 6 in 29, 4 times, reſt 5, which makes the 4, 54; then 6 in 54, 9 times, ſo the Quotient is 120249.

VII. *If after you have divided, there remains any thing*, that which remains is called a Fraction, and muſt be placed at ſome diſtance from the laſt Figure of the Quotient in a leſſer Character, then draw a ſmall ſtroke under it; and place your Diviſor under, as in the Examples following.

(4)	(5)	(6)
7) 54934	8) 316495	9) 314256
$7847\frac{5}{7}$	$39561\frac{7}{8}$	$34917\frac{3}{9}$

VIII. *To prove your Diviſion*, Multiply your Quotient by the Diviſor, to which add the Remainder; if the Product be the ſame as your Dividend is, your work is true.

	8) 85436	7) 364153	9) 314254
	$10679\frac{4}{8}$	$52021\frac{6}{7}$	$34917\frac{1}{9}$
Proof	85436	364153	314254

To prove this laſt Example, where I divide by 9, I multiply 7, the Unit of my Quotient, by 9, the Diviſor, which makes 63, and the Remainder I added to it, makes 64; ſo I put 4, and carry 6, and ſay, 9 times 1 is 9, and 6 is 15, 5 and carry 1; then 9 times 9 is 81 and 1 I carry is 82, 2 and carry 8; then 9 times 4 is 36 and 8 is 44, 4 and carry 9; then 9 times 3 is 27 and 4 is 31, which put down, ſo the Product is 314254, the Sum equal with the Dividend, which was to be proved.

IX. *But if the firſt Figure of the Dividend towards the left hand, be leſſer than the firſt Figure of the Diviſor*, as in the Fifth and Sixth Examples of the Seventh Rule; then make the two firſt Figures your Dividual, and proceed as before.

Other Examples of Diviſion by the foregoing Rules, without their Proofs.

	9) 51376	11) 413795	12) 413271
Quot.	$5708\frac{4}{9}$	$37617\frac{8}{11}$	$34439\frac{3}{12}$
Proof	51377	413795	413271

To Divide by 11, ſay, 11 in 41, 3 times, reſt 8, which makes the 3, 83; then 11 in 83, 7 times, reſt 6, which makes the 7, 67; then 11 in 67, 6 times, reſt 1, which makes the 9, 19; then 11 in 19, 1 time, reſt 8, which makes the 5, 85; then 11 in 85, 7 times, the remainder is $\frac{8}{11}$, ſo the Quotient is 37617 $\frac{8}{11}$.

And after this manner you may divide any Number by 12, 120, or 1200, as in the following Examples, the Multiplication Table being ſo compoſed, as to aſſiſt you in the multiplying and dividing by 11 and 12 as readily as by any other ſingle Figure.

X. To divide any Number by 10, 100, or 1000, as many Cyphers as you have in your Diviſor, cut off ſo many Figures from the Unit of your Dividend, as in the following Examples.

1|0) 4150|7 1|00) 3142|67 1|000) 91|437

Quot. 4150 $\frac{7}{10}$ 3142 $\frac{67}{00}$ 91 $\frac{437}{1000}$

XI. *But if the Figure of the Diviſor be more than a Unit, and Cyphers follow it,* in ſuch caſes, as many Cyphers as you have in the Units of your Diviſor, cut off ſo many Figures from the Unit of your Dividend, and proceed to divide as in ſingle Figures.

7|0) 5432|6 3|00) 84295|67

Quotient 776 $\frac{6}{70}$ 28098 $\frac{167}{300}$

Proof 54326 8429567

Various Examples for the Learners Practiſe.

	11|0) 372045|6	12|0) 412678|5
Quotient	33822 $\frac{36}{110}$	34389 $\frac{105}{120}$
Proof	3720456	4126785
	11|00) 621496|75	12|00) 814653|70
Quotient	56499 $\frac{775}{1100}$	67887 $\frac{970}{1200}$
Proof	62149675	81465370

Diviſion *by two or more Figures,* being the hardeſt Leſſon in Arithmetick, muſt be heedfully attended by the Learner, for whoſe eaſe I ſhall endeavour to make the way ſmooth, both by Rules and Examples.

XII. *When the Diviſor conſiſteth of more places than one,* then you are to ſet out ſo many Figures on the left hand of the *Dividend* for a *Dividual,* and then put a point under that Figure of the *Dividual* which ſtands next to the right hand.

Then ſeek how often the firſt *Figure* towards the left hand of the *Diviſor,* is contained in the firſt *Figure* towards the left hand of the ſaid *Dividual,* and place the Anſwer in the *Quotient.*

Then *Multiply* the whole *Diviſor* by the ſaid Figure, ſo placed in the *Quotient,* and place the *Product* in order under the *Dividual.*

Which being done, *ſubtract* the ſaid *Product* from the *Dividual,* placing the *Remainder* below the Line.

Then put a Point under the next *Figure* of the *Dividend*, and annex it to the *Remainder*, ſo have you a new *Dividual*, with which you are to proceed as is before directed.

Example 1.

Let it be required to Divide 8904 by 42. Here the given Numbers being diſpoſed of according to the Fourth Rule of this Chapter, will ſtand as followeth.

42) 8904 (

Then becauſe there are 2 places in the Diviſor, I take the two firſt Figures on the left hand of the Dividend for a Dividual, which is 89, puting a Point under the 9, which is that Figure of the Dividual which ſtands next to the right hand.

Then I ſeek how often the firſt Figure (4) of the Diviſor, is contained in the firſt Figure (8) of the Dividual, and the Anſwer is 2 times, wherefore I put 2 in the Quotient, and thereby I multiply the Diviſor 42, and the Product is 84, which I place in order under the Dividual 89, and Subtract it therefrom, and the remainder is 5.

Then I put a Point under the next place, which is (0), and annex to the ſaid remainder 5, and it makes 50 for a new Dividual, and then the Work will ſtand as followeth.

42) 8904 (2
 . .
84
——
 50

In the next place I ſeek how often I can have the firſt Figure of the Diviſor (which is 4) in the firſt Figure of the Dividual 50 (which is 5) and the Anſwer is 1 time, wherefore I put one in the Quotient, and thereby multiply the Diviſor 42, and the Product is 42, which I place in order under the Dividual 50, and Subtract it therefrom, and the remainder is 8, which I place in order under the Line, and thereto annex the next Figure of the Dividend, which is 4, (having firſt put a Point under it) and it makes 84 for a new Dividual, and then the Work will ſtand as followeth.

```
42) 8904 (212
    84
    --
     50
     42
     --
      84
      84
      --
       0
```

3. Then I again ſeek how often the firſt Figure of the Diviſor (which is 4) is contained in the firſt Figure of the Dividual (which is 8) and the Anſwer is 2 times, wherefore I put 2 in the Quotient, and thereby multiply the Diviſor 42, and the Product is 84, which I place orderly under the Dividual 84, and ſubtract it therefrom, and there remains 0. So is the Operation ended, and I find that 8904 being divided by 42, the Quotient is 212, as by the foregoing Operation appeareth.

XIII. *When you have multiplied the Diviſor by the Figure placed in the Quotient,* if the Product chance to be greater than the Dividual, then you may be ſure that the Figure placed in the Quotient is too much; wherefore in ſuch caſe you muſt cancel that Figure, and in the room thereof put one that is leſs by an Unit, and if the Product be yet bigger than the Dividual, place yet a leſſer Figure than that in the Quotient, and then proceed as has been before directed.

Example 2.

Let it be required to divide 7868 by 37. The given Number being placed according to former Direction, I begin the Work, and firſt I ſeek how often I can have 3 (the firſt Figure of the Diviſor) in 7 the firſt Figure of the Dividual 78, (having before put a point under the 8,) and the Anſwer is 2 times, wherefore I put 2 in the Quotient, and thereby multiply the Diviſor 37, and the Product is 74, which being Subtracted from the Dividual 78, there remains 4, to which having annexed the next Figure of the Dividend (6) it makes 46 for a new Dividual. Then I proceed to ſeek how often 3 is contained in 4, and the anſwer is 1 time, wherefore I put 1 in the Quotient, and thereby multiply the Diviſor 37, and the Product is 37, which being ſubtracted from the Dividual 46, the remainder is 9, to which the next Figure of the Dividend being annexed, *viz.* 8, it makes 98 for a new Dividual. Then I proceed to ſeek how often I can have 3 in 9, and the anſwer is 3 times, wherefore I put 3 in the Quotient, and thereby I multiply the Diviſor 37, and the Product is 111, which is more than *the* Dividual, whereby I perceive that I have put a Figure too big in the Quotient; therefore according to the directions given in the foregoing Rule, I cancel the 3, and inſtead thereof I place a 2, and then multiply the Diviſor thereby, and the Product is 74, which is leſſer than the Dividual, wherefore I make Subtraction and there remains 24; and ſo having never another Figure to bring down from *the* Dividend, I conclude the work to be ended, and the Quotient thus found is 212, as by the following Operation appears.

2d. *Example,* 37) 7868 (213
...
74
46
37
98
~~111~~
74
Remainder (24)

And here note, that if at any time it ſo happens, that after you have multiplied the Diviſor by the Figure laſt placed in the Quotient, and Subtracted the Product from the Dividual, if the Remainder be greater than the Diviſor, the Figure laſt placed in the Quotient is too little, and therefore it muſt be cancelled, and a bigger Figure placed in its room. What is to be done with the remainder after Diviſion is ended, ſhall be ſhewed in its due place, but only for the preſent let it ſuffice to underſtand, that it is the Numerator of a Fraction which is part of the Quotient, the Diviſor being the Denominator to the ſame. So the true Quotient of the laſt Diviſion is 212$\frac{4}{7}$. But more of this hereafter.

XIV. *When* (according to the Directions given in the laſt Rule) *you have aſſigned your Dividual to conſiſt of as many Places as the Diviſor containeth places,* if then the Dividual be leſs than the Diviſor, (ſo that the Diviſor cannot be Subtracted therefrom) you are then to annex another Figure thereto, ſo that then it will conſiſt of one place more than the Diviſor hath places, and then you are to ſeek how often the firſt Figure of your Diviſor is contained in the two firſt Figures of the Dividend; and then proceed according to the Rules before delivered.

The like is to be obſerved in the middle of your Work, if the Dividual chance to conſiſt of one Figure more than the Diviſor, as in the following Example.

Example 3.

Let it be required to divide 4763585 by 587. Here, becauſe the Diviſor 587 conſiſteth of 3 places, therefore I ſhould take the 3 firſt Figures to the left hand of the Dividend for a Dividual, which is 476, but becauſe 476 is leſſer than the Diviſor 587, I therefore put another Figure thereto, and then I have 4763 for a Dividual, and having firſt put a point under the Figure 3, I begin the Diviſion, and firſt I ſeek how often 5 (the firſt Figure) of the Diviſor, is contained in 47 (the two firſt Figures of the Dividend) which I find to be 9 times, but having tryed according to the Thirteenth Rule of this Chapter, I find 9 is too much, but it will bear 8, wherefore I put 8 in the Quotient, and having Multiplied the Diviſor thereby, and Subtracted the Product from the Dividual, according to the Direction given in the Twelfth Rule of this Chapter, I find the remainder to be 67, to which I annex the next Figure of the Dividend, which is 5, having firſt put a Point under it (according to the ſaid Twelfth Rule) and then I have 675 for a new Dividual. Then I ſeek how oft 5 (the firſt of the Diviſor) is contained in 6 (the firſt of the Dividend) and the anſwer is 1, which I put in the Quotient, and having Multiplied and Subtracted, I find the remainder to be 88, to which annexing the next Figure in the Dividend, it makes 888 for a new Dividual, then I ſeek, &c. And after Subtraction there is a Remainder of 301, to which annexing the next and laſt Figure of the Dividend, which is 5, it makes 3015 for a Dividual, which conſiſteth of one place more than the Diviſor, therefore according to the latter part of the Fourteenth Rule, I ſeek how often 5 is contained in 30, and by tryal according to the Tenth Rule, I find it will bear 5 times, wherefore I put 5 in the Quotient, and having Multiplied and Subtracted, I find the Remainder to be 80, and the work is ended, and I find the Quotient to be $8115\frac{80}{587}$. See the following Work.

3d. *Exam.* 587) 4763585
4696

Quot. 8115

675
587

888
587

3015
2935

080 Remainder.

Exam. Divide 72164375 by 9437.
9437) 66059 · · · (7646 *Quot.*

61053
56622

44317
37748

65695
56622

Remainder 9073

Thus have I run through one ſort of Diviſion, and I hope that by this time the Learner is able to divide any number given, and here let him take notice once for all, that there muſt never be brought down but one Figure or Cypher at one time from the Dividend, to be annexed to the Remainder for a new a new Dividual, and for every ſuch Figure or Cypher ſo brought down, there muſt be a Figure or Cypher put in the Quotient.

I might give you many more Examples of Diviſion, wherein the Diviſor may conſiſt of 4, 5, 6, 7, 8, 9, 10, *&c.* places, but the Method being the very ſame with what is before delivered, I ſhall therefore forbear, and only admoniſh the Learner to be perfect in the foregoing Rules, and to practice well the Examples therein delivered; and for further Practice, I ſhall give you the Quotients of four other Examples, but ſhall omit the Operation as a Whetſtone for the Learners Ingenuity.

If you divide 2459337766 by 384, the Quotient will be 63942, and the Remainder after the Work is finiſhed 562.

And if you divide 4926735806877 by 5846793, the Quotient will be 842639, and there will be a Remainder of 150.

Or if you divide 1079245884216 by 1998573 the Quotient will be 540008, and there will be a Remainder of 475632.

Alſo if you divide 2395096414141498 by 297864, the Quotient will be 8040905964, and there will be a Remainder of 80602.

There is yet a much ſhorter (*way of*) *Diviſion*, by omitting to ſet down the Multiplication of your Diviſor, (as is done in the foregoing Examples) and in this you Multiply and Subtract together: In which way the Quotient is placed under the Diviſor, as being moſt ready and convenient for the working of any Sum. And being the moſt accurate and ready Way of Diviſion, I ſhall purſue this Method through the remaining part of this Book, after I have given three or four Examples of one, and the ſame Sum divided by both ways for the Learners Eaſe and Practice.

Let us divide the two laſt foregoing Sums by this ſhort *Italian* way of Diviſion, *viz.* the third and fourth Examples.

Firſt of all, Let be required to divide 4763585 by 587, being the third Example.

Firſt, I proceed and ask the Queſtion, as was ſhewed you in the third Example of this Rule, and ſay, how often 5, the firſt Figure of the Diviſor, can I have in 47, the firſt Figures of the Dividend? Anſwer, 8 times. Then Multiply 7, the Unit Figure of your Diviſor, by 8, the Figure which you bring in your Quotient, and ſay, 8 times 7 is 56 out of 3 (the fourth Figure of the Dividend) I cannot, but 56 out of 63, reſt 7, and carry 6 to the ſecond Figure of the Diviſor. Then Multiply again, and ſay, 8 times 8 is 64, and 6 I carried is 70, out of 6 I cannot, but 70 out of 76, reſt 6, and carry 7 to the firſt Figure of the Diviſor; then multiply again, and ſay, 8 times 5 is 40, and 7 I carried is 47 out of 47, reſt 0. So that by this Operation you find after 8 times, 587 is taken out of 4763, there will remain 67, to which I take down 5, the next Figure of my Dividend, for a new Dividend.

587) 4763585

8 675

Then I proceed again, and ſay, how often 587 (my Diviſor) can I have in 675, my Dividend? The Anſwer is once, which I put in the Quotient, and Multiply as before, and ſay, once 7, out of 5 I cannot, but 7 out of 15 reſt 8, and carry 1; then once 8 is 8, and 1 is 9, 9 out of 7 I cannot, but 9 of 17, reſt 8, and carry 1; then once 5 is 5, and 1 I carry is 6, 6 out of 6, there reſts (0) which I omit to place down, becauſe a (0) on the left hand is inſignificant. Then to the Remainder 88 I take down 8, the next Figure of my Dividend, and it makes my new Dividend 888.

```
587)4763585
———
81      675
         888
```

Then I proceed again, and aſk, how often 587, my Diviſor, can I take out 888, my Dividend, the anſwer is once, which 1 I put in the Quotient, and ſay, once 7 out of 8, reſt 1; then once 8 is 8, out of 8, reſt 0; then once 5 out of 8, reſt 3; ſo the Remainder of that Diviſion is 301, to which I take down 5, the next figure of my Dividend which makes my new Dividend 3015.

```
587)4763585
———
811  675
      888
       3015
```

Then I proceed and aſk again, how often 587 I can have in my laſt Dividend 3015, the Anſwer is 5 times, which 5 I place in my Quotient and multiply as before, and ſay, 5 times 7 is 35, out of 5 I cannot, but 35 out of 35, reſt 0, and carry 3; then again, 5 times 8 is 40, and 3 I carry is 43, out of 1 I cannot, but 43 out of 51, reſt

8, and carry 5; then laſtly, 5 times 5 is 25, and 5 I carry is 30, 30 out of 30 reſt 0. So my Remainder of this laſt Diviſion is 80, which I cut off with a ſtroke from the reſt of the *Work* to ſignifie it to be a Remainder, and my whole Operation of the Sum ſtands as followeth.

Example I.

Dividend.
Diviſor 587) 4763585

Quotient 8115
675
888
3015

80 Remainder.

Example II.

9437) Divide 72164375 by 9437.

Quotient 7646

56622
37748
56622
66059

72155302
9073

72164375

61053
44317
65695

9073

Proof, is to Multiply the Quotient by the Diviſor, and to the Product add the Remainder.

Examples of the ſhort Italian *way of Diviſion for the Learners Practice, with their Proofs.*

```
            297546)   1489751828835
                         • • • • • •
Quotient  5006765       02021828
           297546         2365528
                           2827063
        30040770           1491495
       20027180
      25033975             03765
     35047565
    45061155
   10013590

   1489751825070
          3765 Remainder.

   1489751828835 Proof.
```

The ſame Examples after the long Italian *way of Diviſion, with their Proof.*

```
297546)  1489751828835  (5006795
         1487730• • • • • •

               2021828
               1785276

               2365528
               2082822

               2827063
               2677914

               1491495
               1487730

Remainder      3766
```

To prove ſuch Diviſion.

1. Multiply your Quotient by your Diviſor (and to the Product add your Remainder, if any be) the Sum of all added together will be equal to your Dividend, if your Work be true. Or,

2. You may take the ſeveral Products that are placed under each *Dividual* (in this way of Diviſion,) and place them in the ſame order as they there ſtand in reſpect to one another, and to their Sum add the Remainder, and the *Proof* will ſtand as followeth.

1487730
1785276
2082822
2677914
1487730
3765 Remainder.

14897518288335 Proof

O R,

You may alſo prove Diviſion by caſting out the Nines thus.

Firſt make a Croſs, then caſt the Nines out of your Diviſor, and place the remainder on the left ſide of the Croſs. *Then* caſt the Nines out of your Quotient, and place the remainder oppoſite to the other on the right ſide of the Croſs ? *Multiply* theſe two Figures together, and out of your Product caſt the Nines, the overplus carry to the Remainder, and continue to caſt out all the Nines therefrom, and the remainder above Nine place on the top of the Croſs. Laſtly, caſt the Nines out of your Dividend, and if that remainder comes to be the ſame Figure with that placed on the top, your Sum is true; then place that laſt Figure at the bottom of your Croſs.

But the moſt certain Proof of *Diviſion* (as I ſhewed before) is by *Multiplication* and the moſt certain Proof of *Multiplication* is by *Diviſion*, they interchangeably proving each other.

For if you divide the *Product* by the *Multiplicand*, the *Quotient* will be equal to the *Multiplier*.

If you divide the *Product* by the *Multiplier*, the *Quotient* will be equal to the *Multiplicand*.

An Example or two will make this Proof of Diviſion plain.

```
                  (1)
                Dividend.                   (2)
Diviſor     754) 912673          457)   159137
            ----   1586          ----     2203
Quotient    1210    787           348     3757
                 ---------              --------
                    333                   101
```

In the firſt of theſe two laſt Examples my Diviſor is 754, Quotient is 1210, Remainder is 333, and Dividend 912673. *To prove which*, make a Croſs, as in the Margent: Then caſt the Nines out of the Diviſor, there will remain 7, which I place on the left ſide of the Croſs, then caſt the Nines out of the Quotient, reſt 4, Multiply 7 by 4, it makes 28, caſt out the Nines, reſt, 1, which I carry to the remainder, and ſay, 1 and 3 is 4, and 3 is 7, and 3 is 10, caſt out 9, reſt 1, which I place above the Croſs.

```
  1
7 + 4
  1
```

Laſtly,

Laſtly, caſt the Nines out of your Dividend and there will reſt 1, which place under the Croſs and your Sum is true.

XV. When the *Diviſor* conſiſteth of any other Number with a Cypher or Cyphers annexed thereto, then cut off the Cyphers of the *Diviſor* with a daſh of the Pen, and as many Cyphers as you cut off from the *Diviſor*, ſo many places muſt you cut off from the *Dividend*; then proceed to Divide the remaining Figures of the *Diviſor*, as if there were no ſuch Cyphers or Figures in the *Diviſor* or *Dividend* as you cut off, and if nothing remain after *Diviſion* is ended, then ſhall the figures you cut off from the given *Dividend* be the true Remainder; but if any thing do remain after *Diviſion* is ended, you are there to annex the figures of the *Dividend* that were before cut off, ſo ſhall the ſaid remainder with the Figures annexed thereto be the true remainder.

Example.

Divide 486783 by 15000. Firſt, I cut off the three Cyphers of the *Diviſor*, and alſo three places of the right hand of the *Dividend*, ſo have I 15 for my Diviſor, and 486 for my Dividend, *viz.*

```
15|000) 486|793 (32
        45
        ----
         36
         30
         --
          6
```

The ſame ſhort way of Diviſion.

```
15|000) 486|793
  ──────── 36
32        ───
           6
```

Here I find the *Quotient* to be 32, and the remainder is 6, to which annexing the Figures cut off from the *Dividend, viz.* 793, it makes 6793 for the true Remainder.

Having thus enlarged and finiſhed the firſt Fundamental Rules of *Arithmetick*, their Application ſhall be more particularly Taught, in the following Chapters.

CHAP. VI.

Of REDUCTION.

I. REDUCTION Teacheth to Reduce Numbers, *whether Money, Weight, Meaſure, Time, Motion,* &c. *from one Denomination to another, diſcovering the ſame value, but in different Terms.*

II. The whole Work of Reduction is performed by Multiplication and Diviſion.

III. All great Denominations are brought into leſſer of the ſame value by Multiplication, and this is by ſome called *REDUCTION DESCENDING.*

IV. All *ſmall* Denominations are reduced into greater of the ſame value by *Diviſion*;

and this is by ſome called *REDUCTION ASCENDING.*

V. *To reduce greater Denominations into leſſer of the ſame value,* Conſider how many of the *Leſſer* are equal to one of the *Greater,* and multiply the given Number thereby, ſo ſhall the Product be the Anſwer to the Queſtion.

Example.

Reduce 3468 *Shillings into Pence.*

3468
12
fa. 41616 pence

Here I conſider that 12 *Pence* is a *Shilling*, and the *Pence* ought to be 12 times the number of *Shillings*, wherefore I multiply by 12 at one Operation, according to the Fourteenth Rule of the fourth Chapter, and the Product is 41616 *Pence*, as in the Margent.

VI. *To Reduce Smaller Denominations into Greater*, Conſider how many of the *Smaller* are equal to one of the *Greater*, and divide thereby, the Quotient is the Anſwer to the Queſtion.

Example.

Reduce 41616 *Pence into Shillings.*

12) 41616
fac. 3468 Shill.

Firſt, conſider that 12 *Pence* is a *Shilling*, and that the *Shillings* ought to be a twelfth part of the *Pence*; wherefore I divide the given Number by 12 at one Operation, as was ſhewed you in the Eleventh Rule of the Fifth

Chapter, and ſay, 12 in 41, 3 times, reſt 5 to the 6 makes it 56; then 56, 4 times, reſt 8, which makes the 181; then 12 in 81, 6 times, reſt 9, which makes the 6, 96; then 12 in 96,] is 8 times, and the Quotient gives me 3468 *Shillings*, which is the Anſwer to the Queſtion, and may ſerve for a Proof of the foregoing Example.

Note, I would Adviſe the Learned to inure himſelf to the moſt ſhort and ready ways of Multiplication and Diviſion, which will very much contract the Operations in Reduction, *viz.* In Reduction of Money, to Multiply the *Shillings* by 12 at one Operation as in Chap. 4. of Multiplication, Rule 14. And likewiſe to divide by 12 at one Operation, as in the 9th and 11th Rules of the fifth Chapter.

For your further Aſſiſtance in Reduction, you ought to have reſpect to the Tables of *Coyn, Weight, Meaſures*, &c. delivered in the ſecond Chapter.

Example. I.

In 685 l. I demand how many Shillings, Pence, and Farthings?

Firſt, I multiply by 20 (becauſe 20 *Shillings* is a *Pound*) and the Product is 13700 *Shillings*, then I multiply the *Shillings*, by 12, (becauſe 12 *Pence* is a *Shilling*) and the Product is 164400 *Pence*, then I multiply the *Farthings* by 4,) becauſe 4 *Farthings* is a *Penny*, and the Product is 657600 *Farthings* as in the Margent.

```
    685 Pounds
     20
   ------
  13700 Shil.
     12
   ------
 164400 Pence.
      4
   ------
fa. 657600 Farth.
```

This or any other number of *Pounds* might be reduced into *Pence* or *Farthings* at one Operation, without reducing it into the intermediate Denominations.

For if you multiply *Pounds* by 240 (becauſe ſo many *Pence make a Pound*) the Product will be *Pence*; and if you multiply *Pounds* by 960 (becauſe 960 *Farthings* is a *Pound*) the Product will be *Farthings*: So in the foregoing Example 685 *l.* being multiplied by 240, the Product you will find to be 164400 *Pence*; and if you multiply 685 *l.* by 960, the Product will be 657600 *Farthings*, for the Reaſons before ſaid.

20 *Shill.*
12
——
240 *Pence*
4
——
960 *Farth.*
one Pound

But you may ſay, you cannot well remember how many *Pence* or *Farthings* make a *Pound*, I will therefore teach you how to find it out at any time when you have occaſion. You may eaſily remember that 20 *Shillings* is a *Pound*, and that multiplied by 12 produceth 240 *Pence*, which being multiplied by 4 produceth 960 *Farthings*, as in the Margent.

Example II.

In 657600 *Farthings, I demand how many Pence, Shillings, and Pounds?*

This Queſtion is the Reverſe of the former, and may ſerve for a Proof thereof: Firſt, I divide the *Farthings* by 4, and the *Quotient* is 164400 *Pence*, then I divide the *Pence* by 12, and the *Quotient* is 13700 *Shillings*, and the *Shillings* I divide by 20, and the *Quotient* is 685 *Pounds*; which is equal to the given Number in the firſt Example. See the whole Operation as followeth:

4) 657600 *Farthings*

12) 164400 *Pence*

2|0) 1370|0 *Shillings*

Facit 685 *Pounds.*

VII. *When in Reduction Deſcending*, the Number propounded to be reduced conſiſteth of divers Denominations, as of *Pounds*, *Shillings*, *Pence* and *Farthings*, or of *Pounds*, *Ounces*, *Penny Weights* and *Grains*, &c. then you may readily reduce it into the loweſt Denomination, thus when you reduce an higher Denomination into the next inferiour, add to the Product the expreſſed parts into which you reduce it, as if you were to reduce *Pounds* into *Shillings*, add to the product (as you multiply) the *Shillings* that are expreſſed in the Number propounded; proceed in the ſame method till ye have reduced the given Number into the Denomination required, as in the following Example.

Example III.

Reduce 567 l. 15 s. 6 d. $\frac{1}{4}$. *into Farthings.*

First, I multiply by 20 to bring into *Shillings*, ſaying, 0 times 7 is 0, but 5 is 5, (taking in the 5 that is in the place of Units in the *Rank of Shillings*, and ſetting it in the place of Units in the Product;) then 2 times 7 is 14, and 1 is 15, (taking in the 1 that is in the place of Tens in the *Rank of Shillings*) ſo I ſet down 5 in the place of Tens in the Product, &c. the Product is 11355 *Shillings*; then I multiply the *Shillings* by

12

12 to bring them into *Pence*, ſaying, 12 times 5 is 60, and 6 is 66, (taking in the 6 that ſtands in the *Rank of Pence*,) &c: and the *Pence*, make 136266; then I multiply my *Pence* by 4 to bring them into *Farthings*, ſaying, 4 times 6 is 24, and 3 is 27, taking in the 3 which ſtands in the *Rank of Farthings*, &c. ſo the *Farthings* amount to 545067, as by the whole Operation appeareth, *viz.*

567 *l.*—15 *s.*—6 *d.* $\frac{3}{4}$
20

11355 *Shillings.*
12

136266 *Pence.*

4
545067 *Farthings.*

Obſerve the like in any other Example.

VIII. *When in Reduction Aſcending* any thing remains after Diviſion is ended, it is always of the ſame Denomination with the Dividend, as in the following Example.

Example IV.

In 545067 Farthings, I demand how many Pounds.

Firſt, I divide the given Number of *Farthings* by 4, and the *Quotient* is 136266 *Pence*, and there remains 3, which is 3 *Farthings*, becauſe the Dividend was *Farthings*.

Then I divide the *Pence* by 12, and the *Quotie* is 11355 *Shillings*, and there remains 6, which is *Pence*, becauſe the Dividend was *Pence.*

Then I divided the *Shillings* by 20, and the *Quotient* is 567 *l.* and there remaineth 15, which *Shillings*, becauſe the Dividend was *Shillings*: So th I find by the work, 445067 *Farthings* to be 567 15 *s.* 6 *d.* ¾. as by the following work.

4) 545067

12) 136266 ¾

2|0) 1135|5 : 6 *d.*

Facit lb. 567. 15 *s.* 6 *d.* ¾.

This Queſtion is the inverſe of the *Third Examp* and may very well ſerve for a Proof thereof, as yo may obſerve at your Leiſure.

Here by the way take notice, that when you a (to *Divide* any Number by 20, that is) to bri *Shillings* into *Pounds*, the Beſt way is to cut off Figure to the right hand for *Shillings*, and then take half the Figures to the left hand for *Pounds*, an If one remain it is 10 *Shillings* to be added to t figure firſt cut off. For *Example.*

Where 11355 *Shillings is to be reduced into Poun* I cut off the laſt Figure 5 for Shillings, and ſay, H of 11 is 5, Half of 13 is Half of 15 is 7, and there mains 1, which make the Shillings to be 15 Shilling and this Method ſhall be obſerved hereafter.

1134|5 *s.* *d.*

Facit. 567—15—0

NOTE, once for all, That Reduction *Aſcending* proves Reduction *Deſcending*, the one being a Reverſe to the other, as ſhall be demonſtrated in the enſuing Queſtions that follow over Leaf in all the Varieties of Reduction.

In 7642l. 17s. 11d. ⅛ *I demand how many (half Farthings*

20

152857 *Shill.*

12

1834295

8

fa. 14674361 *half Farthings.*

Tun. *C.* *qr.* ℔.

Queſt. I. *In* 95 : 11 : 3 : 15 *how many Pound Averdupois Weight (Weight?*

20

1911 *hundred.*

44

7647 *quarters.*

28

61181

15295

Facit 214131

Queſt.

C. qr. lb. oz.
Queſt. 2. *In* 50 : 2 : 15 : 9 *how many Ounces?*
4

202
28

1621
405

5671
16

34035
5671

Facit 90745 *Ounces.*

By this you ſee that if 50 *C.* 2 *qr.* 15 lb. 9 *oz.* be *Multiplied* according to the Directions given in the 9th Rule of this Chapter, the Product will be 90745 Ounces, which is the Reverſe or Proof of the ſecond Queſtion oppoſite to this on the right hand.

Queſt. 1. *In* 214191 *Pound Weight how many Tuns?*
28) 181
133
4) 7647 211

2|0) 191|¾ 15 *Pound.*

Proof, 95 : 11 : 3 : 15. By this you ſee that if 214131 Pound Weight be *Divided* by 28, by 4, and 20, it will produce 25 *Tun,* 11 *C.* 3 *qrs.* 15

15 ℔. which is the Reverſe of the firſt Queſtion on the left hand.

Queſt. 2. *In* 90745 *Ounces how many hundred Weight?*

```
          16) 107
              114
   28) 5671    25
        71    ---
4) 242  ---     9
   ---   15      Ounces.
 90 : 2 : 15 : 9 Proof.
```

```
                       ℥.  dwt. gr.
Queſt. 3.         In   50 : 10 : 11 how many Grains of
Troy   }                   20                   (Silver?
Weight }
              -------
              1010
                24
              -------
              4041
              2021
              -------
Facit        24251 Grains of Silver.
```

```
                oz.  pw.  gr.
Queſt. 4.       507—10—11 how many Grains of Sil-
Troy   }             20                      (ver?
Weight }
          ---------
          10150 penny-weight
             24
          ---------
           40601
          20301
          ---------
Facit.   243611 grains.
```

Tun. hh. gall.

Queſt. 4. *In* 54—2—25 *how many Quarts of (Wine?*

Liquid Meaſure } 4

218 *hhead.*

63

659

1310

13759 *gallons.*

4

Proof 55036 *quarts.*

Laſt. qr. buſh. gall.

Queſt. 6. *In* 75—5—3—2 *how many Gallons of (Wheat?*

Dry Meaſure } 10

755 *quarters.*

8

6043 *buſhels.*

Facit 48346 *gallons.*

Queſt. 7. *In* 243611 *Grains how many Ounces of (Silver?*

24) 36

121

2|0 1015|0

11

Proof 507 : 10 *p. w.* 11 *Grains.*

Queſt. 4. *In* 55036 *Quarts how many Tuns of (Wine?*
4)
63) 13739
115
4) 218 529
54 25 *Gall.*
Facit. 54 : 2*hh.* 25 *Gall.*

Queſt. 5. *In* 48346 *Gallons how many Laſts of (Wheat?*
8)
8) 6043 : 2
10 755 : 3
Proof 75 : 5 : 3 : 2

By the foregoing Examples the Learner may be ſufficiently inſtructed in the working and proving any Sum in *Reduction.* I ſhall forbear to give you any more Examples of this Nature, my deſign being to improve the remaining Paper with Matter more uſeful, after I have given three or four more Examples in *Cloth Meaſure,* and *Reduction of Time.*

Cloth Meaſure.

Queſt. 6. *In* 207 *Ells,* 2 *quarters,* 2 *nails, how (many Nails?*
5
1037 *quarters*
4
Fa. 4150 *Nails.*

Queſt. 7. *In* 107 *Yards*, 3 *quarters*, 1 *Nail*, *how*
(many Nails?
4

431 *quarters*
4

Fa. 1725 *Nails.*

Queſt. 8. *In* 312 *Ells Flem.* 2 *qrs. how many*
(Quarters?
3

938 *quarters.*

Queſt. 9. *In* 112 [illegible], 1 *qr.* 2 *Nails, how many*
(Nails
6

673 *quarters*
4

Fa. 2694 *Nails.*

Long

Long Meaſure.

Queſt. 10. *The Circumference of the Earth being* 360 *Degrees, and every Degree* 60 Engliſh *Miles, I demand how many Miles, Furlongs, Perches, Inches, and Barley Corns will reach round the World?*

360 *Degrees.*
60 *Miles a Degree.*

21600 *Miles about the Earth.*
8

172800 *Furlongs about the Earth.*
40 *Perches in a Mile.*

6912000 *Perches about the Earth.*
33 *Half Feet in a Perch.*

20736000
20736000

228096000 *Half Feet about the Earth.*
6 *Inches in a half Foot.*

1368576000 *Inches.*
3 *Barly Corns in an Inch.*

4105728000 *Barly Corns about the Earth.*

Queſt. 11. *I demand how many Days, Hours, and Minutes it is ſince the Birth of our Saviour Jeſus Chriſt, to this preſent Year, 1701.*

1701 *Years.*
365 *Days in a Year.*
8505
10206
5103
620865 *Days ſince the Birth of Chriſt.*
24 *Hours in one Day.*
2483460 1701
1241730 6
14900760 10206 *hours*
10206 *hours added.* *to be added.*
14910966 *Hours ſince the Birth of Chriſt.*
60 *Minutes in an Hour.*
894657960 *Minutes ſince the Birth of Chriſt.*

Note, That 6 Hours is loſt in every Year, to Correct which, you multiply the Number of Years to be reduced by 6, and the Product will give you the Hours to be added to the given Time, as you may ſee in the Example above.

REDUCTION (according to the firſt Rule of this Chapter) Teacheth you alſo to Reduce the *Coins, Weights,* and *Meaſures* of one Countrey into the *Coyns, Weights,* and *Meaſures* of any other Country. As for Example.

Queſt. 1. *I have bought* 3507 *Ells* Flemiſh *of Genting Cloth, I would know how many Ells* Engliſh *is contained therein.*

The moſt Practical way to work this, is to Multiply the Ells *Flemiſh* by 6, and Divide by 10, which contracts the Work, becauſe to Divide by 10, is only to cut off the laſt Figure of the Dividend. And the Reaſon is this, there is 6 half quarters of a Yard in an Ell *Flemiſh* : And there is 10 half quarters of a Yard in an Ell *Engliſh* : The Work ſtands, *viz.*

3507 *Ells Engl.*
6 *fa.* 2104 $\frac{2}{10}$, *which is equal to* $\frac{1}{5}$ *the quarter of an Ell* Engliſh.

2104|2

Queſt. 2. *In* 4215$\frac{1}{2}$ *Ells* Flemiſh *how many Ells* (Engliſh?
6

Ells Engl.
2529|3 *fa.* 2529 *and* $\frac{3}{10}$, *or three half quarters.*

Queſt. 3. *In* 295 *Ells* Engliſh *how many* Portugal (*Veres of* 15 *Nails?*
20

15) 5900
140
393 50

Veres.
5 *fa.* 393$\frac{5}{15}$

s. d.
Queſt. 4. *In* 205 *Piſtoles, at* 17 : 6 *how many Pound* (*Ster?*
210 12

2050 210
410

24|0) 4305|0 *Pence in all the Piſtoles.*
190
179 225

9 *fac.* 179 *l.* and 90 *Pence.*

Queſt. 5. *In an Ingot of Silver, Quantity* 24 lb. 7. oz. *how many Salvers, quantity* 12 oz. ½.

```
         lb.  oz.
         24   7
         12          12 ½
        ----         ----
        295          25
          2
        ----
   25) 590 half Ounces.
   --   90
   23  ----
        15   fa. 23 Salvers, and 15 half
                     Ounces.
```

Queſt. 6. *In* 142 C. 3 qr. 19 lb. *of Sugar, how many Boxes of* 84 lb.

```
         4
      -----
       571
        28
      -----
      4577
      1143
      -----
 84)  16007  Pound Weight.
 --     706
 190  -----      Boxes.   lb.
          47  fa. 190 and 47 of Sugar.
```

Queſt. 7. *in* 35 l. 11 s. 4 d. *how many Dollers at*
20 (4 s. 6 d.
12.
711
12 24
54) 8536
313
158 436
4 *ſa.* 158 *Dollars and* 4 *Pence.*

Queſt. 8. *In* 75 *Hogſheds of Wine how many Runlets*
63 (*of* 22 *Gallons?*
225
450
22) 4725
32
214 105
Runl.
17 *ſa.* 214 *and* 17 *Gallons.*

Queſt. 9. *In* 905 *Guinea's, at* 21 s. 10 d. $\frac{5}{8}$. *how many Piſtols,* at 17 s. 6 d.
s. *d.* *s.* *d.*
905 —— 21 : 10 $\frac{5}{8}$ —— 17 : 6
2101 12 12
905 262 210
9050 8 8
1810
2101 1680
168|0 . 190140|5
221
1131 534
300
Piſtols.
132 *ſa.* 1131 *and* 1325 *half Farth.*

Queſt. 10. *Bought at* Bourdeaux 10 *Pieces of Pruans, quantity* 95 *Quintals, I demand how many* C. *Weight it makes in* London?

95 *Note,* 100 ℔. *is a Quintal.*
100
112) 9500
84 540
C. ℔.
92 *fa.* 84—92 *in* London.

Queſt. 11. *A Marchant at* London *receives an Invoyce from his Correſpondent at* Jamaica *of ſeveral Hogſheads of Sugar, Quantity* 195 C. 1 qr. 16 ℔. *at* Jamaica, *I demand what Weight they produce at* London?

C. qr. ℔.
195—1—16
4
781
25
3911
1563
112) 19541
834
174 501
53 *fac.* 174—73 *in* London.

CHAP. VII.

The Golden Rule, or Rule of Three Direct.

I. THE *Rule of Three* is ſo called, becauſe in it there are always *three Numbers* given to find out a *fourth.* It is alſo called *the Golden Rule,* for its excellent Performances in the Art of Numbers.

II. The Rule of Three is either *Single* or *Compound.*

III. The *Single* Rule of Three is either *Direct,* or *Inverſe.*

IV. *The ſingle Rule of Three Direct,* is when there are *three Numbers* given to find out a *fourth* in a direct Proportion; That is, when the *fourth* Number ought to bear ſuch Proportion to the *third* as the *ſecond* doth to the *firſt*; Or, as the *firſt* is in proportion to the *ſecond,* ſo is the *third* to the *fourth.* This is called a Direct Proportion.

V. *In the ſingle Rule of Three,* the two firſt of the given Numbers imply a Suppoſition, and the third a Demand.

VI. The *three given Numbers* muſt be ranked in ſuch order, as that the Number to which the demand is affixed may poſſeſs the *third* place, and that Number in the Suppoſition, that is of the ſame Name, Kind, or Quality with that in the *third* place, muſt poſſeſs the *firſt* place, and the other Number in the Suppoſition muſt poſſeſs the *ſecond* place, and is evermore of the ſame Name, Kind, or Quality with the Number ſought.

Example. *If 18 Yards of Camblet coſt 72 s. what will 596 Yards coſt at that Rate?*

In this Example the Suppoſition is this, *viz.* If 18 Yards coſt 72 Shillings. And in the other Number (596) is implied a Demand, *viz.* What will 596 Yards coſt? Therefore muſt 596 Yards be the *third* Number, and that Number in the Suppoſition which is of the ſame kind with 596 muſt be the *firſt* Number, which here is 18, becauſe that ſignifieth Yards as well as the *third* Number; and the other Number in the Suppoſition, which here is 72, is the *ſecond* Number, and is of the ſame kind with the *fourth* Number, or Number ſought; for the Number ſought by the Queſtion is the Price of 596 Yards, and the *ſecond* Number is the Price of the *firſt*, *viz.* 72 Shillings. Now the given Number being duly ſtated and ranked according to the foregoing Directions will ſtand thus,

yrds. s. yrds.
18 ———— 72 ———— 596

VII. *In the Single Rule of Three Direct, if you Multiply the ſecond Number by the third, or (which is all one) the third Number by the ſecond, and divide the Product thereof by the firſt, the Quotient thence ariſing is the fourth Proportional Number ſought, or Anſwer to the Queſtion.* As in the foregoing Example, *viz.* If 18 Yards of Camblet coſt 72 Shillings, what will 596 Yards coſt at that rate? The Numbers given in the Queſtion being ranked according to the Directions given in the ſixth Rule, I multiply the *ſecond* Number (72) by (596) the *third* Number, and the Product is 42912 which being divided by (18) the *firſt* Number, the Quotient is 2384, which is the *fourth* Number, or Anſwer to the Queſtion. See the whole Operation as followeth, *viz.*

```
yrds.           s.               yrds.
18 give ———— 72 ———— what will 596
                                 72
                               ————
                               1192
                              4172
                              —————
                         18) 42912 ſhil.
                      ———    69
                  *fa.* 3484  151
                       ſhil.  72
                              ————
                                0
```

VIII. When (according to the foregoing Directions) you have found out the *Anſwer* to the *Queſtion*, you are always to eſteem it of the ſame Name that your *ſecond* Number was of, or reduced to. So here in the foregoing Example, the Anſwer to the Queſtion is 2384 *Shillings*, becauſe the *ſecond* Number is 72 *Shillings*. And if the *ſecond* Number had been reduced into *Pence*, it makes 864, and then the Anſwer would have been 28608 *Pence*, as by the following Operation appears.

```
yds.          s.                  yds.
 18 give ——— 72 ——— what will     596
              12                  864
             ———                 ————
             864                 2384
                                3576
                               4768
                               ————
                          18) 514944
                          ———  154
                  fa. 28608    109
                                144
                               ————
                                  0
```

Fa. 28608 pence, equal to 2384 ſhillings.

Likewiſe if the *ſecond* Number had been reduced into *Farthings*, it would have been 3456, which being multiplied by (596) the *third* Number, the Product is 2059776, which being divided by (18) the *firſt* Number, the Quotient is 114432 *Farthings*, equal to 119*l.* 4*s.* as before; which you may prove at your leiſure.

IX. When the *ſecond* Number conſiſteth of divers Denominations, as, of *Pounds* and *Shillings*, or of *Pounds*, *Shillings* and *Pence*, then you muſt reduce it to the loweſt name mentioned, or lower if you pleaſe, and then multiply the *ſecond* by the *third* and divide the Product by the *firſt*, *&c.* as before directed.

Example II.

If 26 *Yards of Broad Cloth coſt* 12 l. 02 s. 08 d. *what will* 248 *Yards of the ſame coſt at that Rate?*

The given Numbers in the Example being ranked according to the Directions given in the Sixth Rule aforegoing will ſtand thus.

yds.	*l.*	s.	d.	*yds.*
26	12	02	08	248

Here the *ſecond* Number conſiſteth of divers Denominations, *viz. Pounds, Shillings,* and *Pence.* Therefore muſt it be reduced to the loweſt Name mentioned, which is *Pence*, and it makes 2912, which being Multiplied by (248) the *third* Number, the Product is 722176, which being divided by (26) the *firſt* Number, the Quotient is 27776 *Pence*, becauſe the *ſecond* Number was reduced into *Pence*, which is the Anſwer to the Queſtion, and may be reduced to 115 *l.* 14 s. 08 *d.* As you may ſee by the following Operation.

```
yrds.              l.  s.  d.                  yrds.
 20 ——— give 12—02—08 ——— what 248
                   20
                  ——
                  242 Shillings.
                   12
                  ——
                  2912
                   248
                 ————
                 23296
                11648
                5824
               ——————
          26) 722167
          ——   202
12) 2776 d.     201
    ————        197
2|0) 231|4 : 8  156
     ————       ———
     115 : 14 : 8   0

         s.   d.
fa. 115 : 14 : 8.
```

X. If the *firſt* and *third* Numbers, or either of them, conſiſt of divers Denominations, then muſt they be both reduced to the loweſt Denomination mentioned in either of them, as if the *firſt* Number be Hundred Weights only, and the *third* be Hundreds, Quarters, and Pounds, then muſt they be both reduced into Pounds, becauſe Pounds are mentioned in the *third* Number. Or if the *firſt* and *third* Numbers being of one kind, are notwithſtanding of different Denominanations, then muſt they be reduced to one Denomination, as if the *firſt* be Pounds of Weight, and the *third* be Hundred Weights, then muſt the third Number be reduced to Pounds as is the *firſt*.

Example III.

If 1 C. *Weight of Tobacco coſt* 4l. 5s. 2d. *what will* 34 C. 3 qrs. 18 lb. *coſt at that rate?*

In this Example, becauſe the *third* Number has *Pounds* mentioned therein, therefore muſt the *firſt* and *third* Numbers be both reduced to *Pounds*, and the *ſecond* Number, which is 4 *l.* 05 *s.* 02 *d.* muſt be reduced into *Pence* by the fifth Rule of Chap. V. and then the *ſecond* Number being multiplied by the *third*, the Product is 3996020, which being divided by the *firſt*, the Quotient is 35678 *Pence*, which is equal to 148 *l.* 13 *s.* 02 *d.* and 84 remaineth, and how that or any other ſuch like remainder may be ordered, ſhall be taught by and by. See the following Operation.

```
 ℔.     l.  s.  d.           C.  qr. ℔.
112 coſt 4—5—2————————————34—3—18
        20                  4
       ——                 ———
        85                 139
        12                  28
       ——                 ———
      1022 pence          1120
                           279
                          ———
                          3910
                          1022
                          ———
                          7820
                         7820
                        39100
                        ————
             112)       3996020
             ———         636
        12) 35678        760
            ————         882
            297|3 : 2d. 980      84
————————————————————————————————  ——
Facit. 148 : 13 : 2 84/112 84     42
```

Example.

If 14 ℔. *of Sugar coſt* 5 s. 3 d. *what will* 46 C. *Weight coſt at that rate?*

In this Example the *third* Number muſt be reduced into *Pounds*, becauſe the firſt Number is Pounds, and it makes 5152, and the ſecond Number muſt be reduced into Pence, making 63, then

the

he ſecond number being multiplied by the third, the roduct is 324576, which being divided by (14) he firſt Number, the Quotient is 23184 Pence for e Anſwer; which is equal to 96 *l.* 12 *s.* as by the llowing Operation appears.

```
b.                     s.          d.              C.
4 ———————— Sugar  5 ———————— 3 ————————————— 46
                  12                              112
                  ——                              ———
                  63                               92
                                                  506
                                                 ————
                                                 5152
                                                   63
                                                 ————
                                                15456
                                               30912
                                               ——————
                                          14) 324576
                                 2) 23184 ——— 44
                                    —————      25
                                    193|2      117
                                    —————       56
                                                ——
                           facit 96. 12 s.       0
```

XI. When you have multiplied the ſecond Number y the third, and divided the Product thereof by the rſt. If any thing remain after Diviſion is ended, is part of an Unit in the Quotient, and its value ay be found out thus, *viz.*

Multiply the ſaid Remainder by the parts of e next inferior Denomination that are equal to Unit of the Quotient, and divide that Product the firſt Number, ſo ſhall the Quotient be the value of the ſaid remainder in the ſaid Parts, and if any thing yet remain, Multiply it by the parts of the next inferior Denomination, that are equal to an Unit of the laſt Quotient, and divide the Product by the ſaid Number, *&c.* Proceed thus till you have brought it as low as you deſire: And if any thing remain at laſt of all, it is a part of an Unit of the leaſt Denomination into which you reduce the ſaid Remainder, and muſt be placed according to the Direction given in the fourth Rule of the fifth Chapter.

In the third Example foregoing after the Diviſion is ended, there is a remainder of 84, which ſheweth that the Anſwer to the Queſtion is not exactly 35678 Pence, or 148 *l.* 13 *s.* 02 *d.* as it is there found, but it is ſomething more: therefore to find the value of this Remainder 84, I multiply it by 4, (becauſe 35678 the ſaid Quotient is Pence) and the Product is 336, which I divide by the firſt Number 112, and the Quotient is 3 Farthings, without any other Remainder, and ſo is the true Anſwer to that queſtion 148 *l.* 13 *s.* 02 *d.* $\frac{3}{4}$. Mind the Operation of the next Example.

Example V.

If 1 *C. Weight of Currans coſt* 2 l. 14 s. *what will* 24 *C.* 3 *qrs.* 16 lb. *coſt at that rate?*

```
 lb      l.     s.              C     qr.    lb.
112 ——— 2 ——— 14              24 ——— 3 ——— 16
        20                     4
        ——                    ——
        54                     99
                               28
                              798
                              ———
                              199
                              ———
                             2788
                               54
                            —————
                            11152
                            13940
                            —————
              112)         150552
              ———           385
       ſhill. 1344          495
              ———           472
facit. pence   2            ———
              ———            24
       farth.  2             12
                            ———
                            288
                            ———
                             64
                              4
                            ———
                            256
                             32
```

In the Work of the foregoing Example, you may obſerve that the ſecond Number is reduced no lower than Shillings, making 54; therefore the Quotient is 1344 Shillings, equal to 67 *l.* 4 *s.* and there is a Remainder of 24: Therefore to find out how many Pence is contained therein, I multiply it by 12, and the Product is 288, which being divided by 112 (becauſe that is the firſt Number) the Quotient is 2 Pence, and there is a Remainder of 64, which I multiply by 4, (to find its Value in Farthings,) and the Product is 256, which I divide again by 112, and the Quotient is 2 Farthings, and there is a Remainder of 32, which according to the 4th Rule of Chapter VI. is $\frac{32}{112}$ of a Farthing; and ſo the Anſwer to the Queſtion is 67 *l.* 04 *s.* 2 *d.* 2 *qrs.* $\frac{32}{112}$. The like may be obſerved of any other.

Example VI.

If 24 *Yards of Camblet coſt* 4 l. 16 s. *I demand how many Yards I may buy for* 126 l. *Facit* 360 yds. The Terms being ranked as is directed in the Sixth Rule of this Chapter, will ſtand thus, *viz.*

```
 l.  s.      yds.        l.
 4—16———————24——————————126
20                        20
——                     —————
96                      2520
                          24
                       —————
                       10080
                        5040
                       —————
                   96) 60480
                 ——      288
                630      ———
                          00
```

Having thus demonſtrated the reaſon of the *Single Rule of Three Direct* in the ſix foregoing Examples, I ſhall proceed now to propoſe ſeveral Queſtions in the Rule of Three for the Learners Practice, and only ſet down their *Facits*, as a further help to them in the working of their Queſtions.

Queſtion 1. If an Ounce of Silver coſt 5 *s.* 4 *d.* what will 46 *oz.* 15 *pw.* 12 *gr.* coſt? *Facit* 12 *l.* 09 *s.* 5 *d.* $\frac{288}{480}$.

Queſt. 2. If 12 Yards of Broad-cloth coſt 7 *l.* 6 *s.* I demand how much I ought to give for 26 Pieces, each Piece containing 27 Yards? *Facit* 427 *l.* 1 *s.*

Queſt. 3. If 18 yards of *Cambrick* coſt 4 *l.* 13 *s.* I demand the Price of 73 Pieces, each Piece containing 34 Ells *Flemiſh*? The Ell *Flemiſh* being 3 quarters of a Yard? *Facit* 480 *l.* 17 *s.* 9 *d.*

Queſt. 4. If 17 C. 3 qrs. 17 lb. of Tobacco coſt 145 *l.* 12 *s.* I demand how much the Ounce ſtands me in at that rate? *Facit* 1 *d.* $\frac{2864}{32080}$ per Ounce.

Queſt. 5. If 112 lb. of Lead coſt 15 *s.* 11 *d.* I demand the Price of 54 Fother, each being 19 C. $\frac{1}{2}$? *Facit* 838 *l.* 0 *s.* 3 *d.*

Queſt. 6. When 7 lb. of Tobacco coſt 5 *s.* 9 *d.* $\frac{1}{2}$ what will 30 C. weight coſt? *Facit* 139 *l.*

Queſt. 7. When the Tun of Wine coſt 51 *l.* 14 *s.* what coſt the Quart at that rate? *Facit* 12 *d.* $\frac{1}{4}$.

Queſt. 8. At a Noble *per* Week, how many Months Board may I demand for 50 *l.*? *Facit* 22 Months and 2 Weeks.

Queſt. 9. A Grocer bought 30 Frails of Raiſins, each Frail weighing 91 lb. weight, at 18 *s.* 8 *d.* *per* C. I demand how much they amount to? *Facit* 22 *l.* 15 *s.*

Queſt. 10. What comes the Commiſſion of 462 *l.* 11 *s.* 09 *d.* to at 3 ½ *per Cent.* *facit* 22 *l.* 9 *s.* 9 *d.*

Queſt. 11. What comes the Inſurance of 375 *l.* 9 *s.* 4 *d.* to at 3 Guinea's *per Cent.* the Guinea's at 21 *s.* 9 *d.* ⅝? *facit* 12 *l.* 5 *s.* 6 *d.*

Queſt. 12. A Corn Factor bought 248 Quarters of Wheat for 511 *l.* 06 *s.* 8 *d.* for an 100 Quarters of which he gave 33 *s.* 04 *d.* *per* Quarter, I demand how much he gave *per* Quarter for the Remainder? *facit* 2 *l.* 6 *s.* 6 *d.*

Queſt. 13. If a Piece of Cloth coſt 21 *l.* 5 *s.* I demand how many Yards were in the ſame, the Yard being valued at 12 *s.* 6 *d*? *facit* 34 Yards.

Queſt. 14. If a Piece of Cloth coſt 24 *l.* 5 *s.* 4 *d.* I demand how many Yards were contained in the ſame, when the Ell Engliſh is worth 17 *s.* 4 *d.*? *facit* 35 Yards.

Queſt. 15. Bought 124 Pieces of Camblet for the Sum of 987 *l.* 14 *s.* 8 *d.* at 4 *s.* 8 *d.* *per* Yard, I demand how many Yards there were in all, and how many Ells *Flemiſh* there were in a Piece? *facit* 4233 Yards, and 45 ½ Ells *Flemiſh per* Piece.

Queſt. 16. A Gentleman hath an Eſtate of 1224 *l.* *per Annum*, and his Expences one day with another amount to 1 *l.* 13 *s.* 4 *d.* I demand how much he layeth up at the Years end to purchaſe with? *facit* 615 *l.* 13 *s.* 4 *d.*

Queſt. 17. A Gentleman expendeth one day with another 43 *s.* 6 *d.* ½ and at the Years end layeth up 850 *l.* I demand his Annual Eſtate? *Facit* 1644 *l.* 12 *s.* 8 *d.* ½ *per Annum.*

Queſt. 18. Bought 3 Hogſheads of Nutmegs, bc. viz. at 5 *s.* 7 *d.* the Ounce, I demand the Neat coſt thereof?

N° 1

	C.	qr.	lb.
N° 1	3	2	21
2	4	1	14
3	4	2	18
	12	2	25

4

50
28

405
102

1425
16

8550
1425

22800 at 5 *s.* 7 *d.* Fa. 6365 *l.*

Queſt. 19. A Merchant conſigns to his Factor in *Spain* 188 Cloths, with Commiſſion for Sale at 23 *l.* 2 *s.* 2 *d. per* Cloth, and to make Returns from thence, the one half in Wines at 28 *l. per Tun*, and the other half in Sugar at 27 *s. per C. Weight*, I demand how much of each ought to be returned for the Cloths?

Anſwer, The whole Value of the Cloth is 4344 *l.* 7 *s.* 4 *d.* the half whereof is 2172 *l.* 2 *s.* 8 *d.* which will buy 77 $\frac{3884}{6720}$ Tuns of Wine at 28 *l. per Tun*, and the other half will buy 1609 $\frac{8}{324}$ Hundred Weight of Sugar.

Queſt. 20. If 100 *l.* in 12 Months gain 6 *l.* Intereſt, what will be the Intereſt of 896 *l.* for the ſame time, *facit* 53 *l.* 15 *s.* 2 *d.* $\frac{49}{50}$.

Queſt. 21. An Uſurer putteth out 889 *l.* to Intereſt, and at the end of 12 Months he receives for Principal and Intereſt 932 *l.* 16 *s.* I demand at what rate *per Cent. per Annum* he received Intereſt? *facit* 6 *per Cent.*

Queſt. 22. I demand what Principle in 12 Months will gain 64 *l.* 10 *s.* at the Rate of 6 *per Cent. facit* 1075 *l.*

Queſt. 23. An Orphan is indebted to his Guardian 51 *l.* and the Guardian having in his hands 100 *l.* of the Orphan's, it is agreed between them, that the Guardian ſhall keep the ſame in his hands till the ſaid 51 *l.* be paid by the Intereſt thereof at 6 *per Cent. per Annum.* Now I demand how long he ought to keep the ſame at that Rate? *facit* 8 Years and 6 Months.

Gain and Loſs.

Queſt. 24. A Draper buys 2795 ½ Ell *Flem.* of Genting, at 22 *d.* ½ the Ell *Engliſh.* It is required to know at what Price the Cloth muſt be ſold out to gain 15 *l.* 10 *s. per Cent.* Firſt find the Price it coſt by the Rule of Three, *facit* 157 *l.* 4 *s.* 11 *d.* Then ſay, if 100 *l.* give 15 *l.* 10 *s.* what will 157 *l.* 4 *s.* 11 *d. facit* 24 : 7 : 5, which added to 157 : 4 : 11 makes 181 : 12 : 4. Or if 100 lb. give 115 : 0 : what will 157 : 4 : 11. *Fa.* 181 : 12 : 4. which is anſwered at one Operation.

Loſs and Gain.

Queſt. 25. If the aforeſaid Cloth were to be ſold ſo as to loſe 15 *l.* 10 *s. per Cent.* Firſt ſubtract 15 *l.* 10 *s.* out of 100 *l.* *facit* 84 *l.* 10 *s.* Then ſay, If 100 *l.* fall to 84 *l.* 10 *s.* what ſhall 157 *l.* 4 *s.* 11 *d.* *facit* 132 *l.* 17 *s.* 6 *d.*

Fellowſhip.

Queſt. 26. Three Merchants Company; *A* his Stock was 175 *l.* 12 *s.* *B*'s 214 *l.* 19 *s.* 4 *d.* *C*'s 150 *l.* 11 *s.* 9 *d.* they have gained together 209 *l.* 11 *s.* 4 *d.* I demand each Man's part of *the ſaid Gain? Firſt add the ſeveral Stocks into one Total,* which makes 541 *l.* 3 *s.* 1 *d.* then make three ſeveral Queſtions in the Rule of Three, *viz.*

	l.	*s.*	*d.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*	
If	541	3	1	give	209	11	4	what	175	12	0	*A*
If	541	3	1	give	209	11	4	what	214	19	4	*B*
If	541	3	1	give	209	11	4	what	150	11	9	*C*

facit

Add all the *facits* together, if it make up the *Money* to be *divided*, your *Sum* is true. If you have any remains on the Diviſions add them up into one Total, which divide by the common Diviſor, and the Quotient add to the loweſt Denomination.

Fellowſhip with Time.

Queſt. 27. Three Merchants Company. *A* his Stock was 109 *l.* 5 *s.* for 3 Months. *B* 450 *l.* 7 *s.* for 4 Months. *C* 147 *l.* 12 *s.* for 6 Months, they have gained 209 *l.* 7 *s.* 2 *d.* I demand each Man's part.

This is worked as the laſt precedent Queſtion, only each Man's Stock is multiplied by the time, *viz.*

A 109—05 *B* 450—7 *C* 147—12
3 *mo.* 4 *mo.* 6 *mo.*

A 327—15 *B* 1801—8 *C* 885—12
B 1801—08
C 885—12

l. *s.* *d.* *l.* *s.*
If 3014 : 15 gain 209 : 7 : 2 what will 327 : 15 *A*
If 3014 : 15 gain 209 : 7 : 2 what will 1801 : 08 *B*
If 3014 : 15 gain 209 : 7 : 2 what will 885 : 12 *C*

facit.

Add all the *facits* together, if it make the given Sum 209 *l.* 7 *s.* 2 *d.* your Work is true, otherwiſe falſe.

The Proof of the Single Rule of Three Direct.

To prove a Queſtion in the *Single Rule of Three Direct*, Multiply the fourth Number (or Anſwer to the Queſtion) by the *firſt*, and if the Product thereof be equal to the Product of the *ſecond* and *third*, then is the Operation truly performed, otherwiſe not; as in the firſt Example of this Chapter, *viz.*

If 18 Yards coſt 72 Shillings, what will 596 Yards coſt at that rate? The Anſwer there found is 28608 Pence, which is the fourth Number. Now the Product of the firſt and fourth, *viz.* 28608 by 18 is 514944, which is equal to the

Product the ſecond and third, *viz.* 864 by 596 as you may ſee by the following Operation, where the ſecond Number, *viz.* 72 Shillings is reduced into 864 Pence.

yrds.	*d.*	*yrds.*	*d.*
18	864	596	28608
	596		18
	5184		228864
	7776		28608
	4320		514944
	514944		

And here Note, That if any thing remain after Diviſion is ended, it muſt be added to the Product of the *firſt* and *fourth* Numbers, and then muſt that Sum be equal to the Product of the *ſecond* and *third.* As in the third Example of this Chapter, which is, if 1 *C.* Weight of Tobacco coſt 4 *l.* 5 *s.* 2 *d.* what will 34 *C.* 3 *qrs.* 18 ℔. coſt?

The 3 given Numbers being reduced, are 112 *l.* 1022 *d.* and 3910 *l.* and the fourth Number or Anſwer to the Queſtion is there found to be 35678 *d.* and the Remainder is 84, the Product of the ſecond and third is 3996020, and the Product of the firſt and fourth is 3995936, to which adding the remainder, the Sum is 3996020, equal to the Product of the *ſecond* and *third,* which proves the Work to be true.

l.	d.	l.	d.
112	1022	3910	35678
		1022	112
		7820	71356
		7820	35678
		39100	35678
		3996020	3995936
		remains	add 84
			3996020

CHAP. VIII.

The Single Rule of Three Inverſe.

I. THE *Single Rule of Three Inverſe*, is when the fourth Number, or Number ſought, ought to bear ſuch proportion to the firſt, as the ſecond doth to the third.

II. When a Queſtion in the Single Rule of Three is ſtated, conſider whether the fourth Number (or Anſwer to the Queſtion) ought to be more or leſs than the ſecond Number, which upon a little Conſideration you may diſcover. If it ought to be more than the ſecond, then muſt the leſſer extream be the Diviſor, and if it ought to be leſſer than the ſecond, then muſt the biggeſt of the extreams be the Diviſor, (in this Caſe the firſt and third Numbers are called extreams) and if it fall out that the third Number is the Diviſor, that Queſtion is ſaid to be of *The Single*

Rule of Three Inverſe. As in the following Examples.

Example I.

If 30 *Men can build a Wall in* 32 *Days, I demand in how many days* 60 *Men may do the ſame?*

The given Numbers being ranked according to the ſixth Rule of the ſeventh Chapter, will ſtand as followeth.

Men *Days* *Men*
30———32———60

Then I conſider whether 60 Men will do it in more or leſs days than 32, and find that they will require leſs time than 32 days, (for the more the Men the leſſer the time) wherefore 60, which is the biggeſt extream, muſt be the Diviſor, and the firſt and third muſt be multiplied together, and their Product, which is 960, being divided by the third Number 60, the Quotient is 16 days, and in ſo long time will 60 Men finiſh the ſaid Work. See the following Operation.

Men *Days* *Men*
30———32———60
30

6|0) 96|0

facit 16 *Days*

Example II.

If 100 l. *in* 12 *Months gain* 10 l. *for the Intereſt thereof, I demand what Principal will gain the ſame Intereſt in* 8 *Months?*

Here it being required what Principal will gain 10 *l.* in 8 Months, therefore muſt 100 *l.* Principal be the ſecond Number, according to the Directions in the Sixth Rule in the ſeventh Chapter, and the Numbers being ranked accordingly, will ſtand thus?

Mon. *l.* *Mon.*
12 ———— 100 ———— 8?

Here I conſider, that the ſhorter the time, the more muſt be the Principal to gain the ſame Intereſt; wherefore the leſſer extream muſt be the Diviſor, which here is (8) the third Number, therefore the firſt and ſecond, *viz.* 12 and 100 muſt be multiplied the one by the other, and the Product is 1200, which being divided by (8) the third Number, the Quotient is 150 *l.* and ſo much will gain 10 *l.* Intereſt in 8 Months at 10 *per Cent. per Annum*: See the following Work.

12 ———— 100 ———— 8
12
————
8) 1200
————
facit 150

Example III.

Lent my Friend 120 l. *for* 6 *Months, he promiſing to do me the like Courteſie another time; and not long after I had occaſion for a Sum of Money for* 9 *Months, I demand how much he ought to lend me for that time to retaliate my former Kindneſs?*

Facit 80 *l.* The longer the time, the leſſer ought the Sum of Money to be.

Example IV.

A Footman performs a Journey in 12 *days, when the day is* 15 *hours long, I demand in how many days he may perform the ſame when the day is* 10 *hours long?*

Facit 18 days. The ſhorter the days, the more days will the Journey require.

Example V.

How many Yards of Matting that is half Yard wide, is enough to cover a Floor that is 16 *Foot wide, and* 28 *Foot long?*

Facit 298 $\frac{2}{3}$ Yards of Matting.

Example VI.

Suppoſe that (according to the Statute) when the Buſhel of Wheat coſt 4 s. *the Penny-Loaf ought to weigh Nine Ounces, I demand what the Price of the Buſhel ought to be, when the Penny-Loaf weigheth* 12 *Ounces?*
Facit 3 s. *per* Buſhel.

Example

Example VII.

If when the Tun of Wine coſt 45 l. *a certain quantity worth* 25 s. *is ſufficient for the Accommodation of* 20 *Men, I demand how many Men the ſame* 25 s. *worth will ſuffice when the Tun is worth* 30 l.

Facit 30 Men, for the cheaper the Wine, the more may be bought for the ſame Money.

Example VIII.

If when the Tun of Wine coſt 45 l. *a quantity worth* 50 s. *is enough for the Entertainment of* 40 *Men, I demand the Price of the Tun when* 50 s. *worth is enough for* 90 *Men? Facit* 20 l. *per* Tun.

Example IX.

If 60 *Ells at* London *be qual to* 100 *Ells at* Antwerp, *and each Ell at* London *remains* 20 *Nails of an Engliſh Yard, I demand how many ſuch Nails the Ell of* Antwerp *contains? Facit* 12.

Example X.

If for 5 l. 3 *s.* 4 d. *I can have* 10 C. *weight carried* 140 Miles, *I demand how many Miles I may have* 14 C. *weight carried for the ſame Money?*
Facit 100 Miles.

The Proof of the Single Rule of Three Inverſe.

If the Product of the fourth Term multiplied by the Third, be equal to the Product of the Second multiplied by the First, then is the Work truly performed, otherwiſe not.

Let us prove the firſt Example of this Chapter, *viz. If* 30 *Men can build a wall in* 32 *days, I demand in how many Days* 60 *Men may do the ſame?* The Anſwer is there found to be 16 days, and the fours Terms being duly ranked, ſtand as followeth.

Men	*days*	*Men*	*days*
30	32	60	16
30			60
960			960

The fourth Term (16) being multiplied by (60) the third Term, is 960, which is equal to the Product of (32) the ſecond Term, by (30) the firſt.

CHAP. IX.

The Double Rule of Three Direct.

I. THE *Double Rule of Three*, is when there are Five Numbers given to find out a Sixth in proportion thereunto.

II. A Queſtion in the *Double Rule of Three* may be reſolved by Two Single Rules of Three, or by *One Rule of Three compoſed of the five given Numbers.*

III. When a Queſtion in the *Double Rule of Three* may be ſolved by Two Single Rules of Three Direct, that Queſtion is ſaid to belong to the Double Rule of Three Direct.

IV. Of the five Numbers given in the *Double Rule of Three*, three of them always imply a Suppoſition, as the other Two a Demand. As in the following Example.

If 16 Men can reap 96 Acres of Wheat in 36 days, I demand how many Acres 64 Men may reap in 48 days?

Here the Suppoſition is, *If, or Suppoſe, 16 Men reap 96 Acres in 36 days*; and the Demand is, *How many Acres 64 Men may reap in 48 days?*

V. When you would ſolve a Queſtion in the *Double Rule of Three*, the given Numbers are to be ſo ranked, that the Firſt and Third may be of one Denomination, and the Second Number muſt be of the ſame Quality, Name, or Denomination with the Number ſought; and Note, That the Firſt and Second Numbers muſt be always of the Suppoſition, and the Third of the Demand: So likewiſe muſt the Fourth Number be of the Suppoſition, and the Fifth of the Demand, and both of one Denomination; ſo may each Queſtion be ſolved by Two ſingle Rules of Three, two different ways. As in the Queſtion foregoing, which being again repeated is as followeth.

If 16 Men can reap 96 Acres of Wheat in 36 days, How many Acres may 64 Men reap in 48 days? The Numbers being ranked according to the foregoing Directions, which ſtand as followeth.

	Men	*Acres*	*Men*	
	16 ——	96 ——	64	
days	36 ——	——	48	*days*

Or thus,

	Days	*Acres*	*Men*	
	36 ——	96 ——	48	
Men	16 ——	——	64	*Men*

VI. When a Queſtion in the *Double Rule of Three* is to be ſolved at two ſeveral Operations in the Single Rule of Three, the Anſwer to the firſt Queſtion muſt be the ſecond Number in the ſecond Queſtion, and the fourth and fifth Numbers muſt be the firſt and third in the ſecond Queſtion.

So in the firſt order of ranking the given Numbers in the foregoing Queſtion, the three firſt Numbers, are 16—96—64, wherein is implied this Queſtion, *viz. If* 16 *Men can reap* 96 *Acres, How much may* 64 *reap in the ſame time, viz.* in 36 Days? Multiply and divide according to the Directions given in the Seventh Rule of the Seventh Chapter, and you will find the Anſwer to be 384 Acres; ſo that now I have found how many Acres 64 Men may reap in 36 days, but by the Queſtion it is required to know how much they can reap in 48 days.

Therefore I ſay again by the Single Rule of Three, If 36 *days will reap* 384 *Acres, How many may be done in* 48 *days?* Multiply and Divide, and you will find the Anſwer to the Queſtion to be 512 Acres, and ſo many may 64 Men reap in 48 days, if 16 Men can reap 96 Acres in 36 days. See the whole Work as followeth.

Men *Acres* *Men*
16 —— 96 —— 64
days 36 —— 48 *days*

16 —— 96 —— 64
96
384
576
16) 6144
134
64
0
facit 384 *Acr.*

Days *Acres* *Days*
36 —— 384 —— 48
384
3072
1536
36) 18432
43
72
0
facit 512 *Acr.*

In the ſecond ſtating of the above Work, I multiply 384 by 48 to ſave Paper, for if the two Numbers be multiplied together, it is indifferent whether the Multiplicand, or Multiplier be placed uppermoſt.

Or if the Five given Numbers of the foregoing Queſtion had been ranked, according to the Second Method laid down at the latter end of the Fifth Rule, the Anſwer, would have been the ſame, and the Operation as followeth.

```
      Days               Acres               Days
       36 ——————————————— 96 ——————————————— 48
 Men   16 ——————————————————————————————————— 64
  36 ——— 96 ——— 48   |   16 ——— 128 ——— 64
                96   |                  128
              ————   |                 ————
               288   |                  512
              432    |                 768
              ————   |                 ————
         36) 4608    |           16) 8192
         ———— 100    |           ————  19
facit 128 Acr. 288   |  facit 512 Acr. 32
              ————   |                 ————
                 0   |                    0
```

I doubt not, but that by the Operation before going, this Rule is ſufficiently illuſtrated; but for the Learners further Experience herein, I ſhall propound ſeveral other Examples, and only give their Anſwers, leaving the Operation to the Induſtrious Learner.

Example 2. *I demand the Intereſt of* 75 l. *for* 18 *Months, after the rate of* 6 per Cent. per Annum.

This Queſtion may be more intelligibly ſtated thus, *viz.* *If* 100 l. *in* 12 *Months gain* 6 l. *Intereſt, What will* 75 l. *gain in* 18 *Months at that rate? facit* 6 l. 15 s.

Example 3. *If* 12 *Men can reap* 48 *Acres of Wheat in* 18 *days, I demand how many Acres* 36 *Men may reap in* 24 *days? facit* 192 Acres.

Example 4. *If* 3 *Quarters of Malt is ſufficient for a Family of Six Perſons for two Months, How many Quarters is enough for a Family of* 18 *Perſons for* 12 *Months? facit* 54 Quarters.

Example 5. If 8 Reapers have 3 l. 4 s. for 4 days Work, I demand how much 24 Men will have for 16 days Work? facit 38 l. 8 s.

Example 6. If 336 ℔ *of Bread is ſufficient for* 56 *Men for* 12 *days, I demand how much will ſerve* 460 *Men* 96 *days? facit* 22080 ℔. of Bread.

Example 7. If 40 *Buſhels of Oats be enough for* 8 *Horſes* 20 *Days, I demand how many Buſhels will ſerve* 48 *Horſes* 12 *days? facit* 144 Buſhels.

Example 8. A Banker took in 250 l. *to pay Intereſt for the ſame, and at the end of* 18 *Months he paid* 272 l. 2 s. *for Principal and Intereſt, I demand at what Rate* per Cent. per Annum, *he paid Intereſt?*

CHAP. X.

The Double Rule of Three Inverſe.

I. WHEN a Queſtion in the Double Rule of Three being ſolved at two Single Rules, as is taught in the foregoing Chapter, hath one of theſe Single Rules Inverſe, (for they are never both Inverſe) then is that Queſtion ſaid to be of the *Double Rule of Three Inverſe.*

II. A Queſtion in the Double Rule of Three Inverſe, may be ſtated two ſeveral ways, as well as a Queſtion in the Double Rule Direct, and ſo the Inverted Proportion may be either in the firſt or ſecond Operation at pleaſure.

Example. 1. *If a Footman Travel* 240 *Miles in* 8 *days, when the days is* 10 *hours long, I demand in how many days he may Travel* 720 *Miles, when the day is* 15 *hours long?*

The given Numbers being ranked according to the fifth Rule of the ninth Chapter, will ſtand as followeth,

Miles *Days* *Miles*
240————8————720
Hours 10——————15 *Hours*

Or thus,

Hours *Days* *Hours*
10————8————15
Miles 242——————720 *Miles*

Here according to the firſt manner of ranking the given Terms, the Inverted Proportion is in the ſecond ſingle Operation.

III. You may alſo work the Double Rule of Three either *Direct* or *Inverſe* at one Operation, by the *Compound Rule of five Numbers*, obſerving to rank the ſeveral Terms as is before taught in the fifth Rule of the Ninth Chapter.

IV. And if your Queſtion be of the Double Rule of three Direct, Multiply the three laſt Terms together for Dividend, and the two firſt for Diviſor, as in the following Examples, *viz.*

If 100 l. *in* 12 *Months require* 6 l. *Intereſt, How much Intereſt will* 50 l. *require in* 10 *Months?*

l. *mo.* *l.* *l.*
100 —— 13 —— 6 50
10 —— 10 10 *m.*

100 500
12 6

facit 2 *l.* 10 *s.* 12|00 30|00

2|10

V. But if your Queſtion be of the *Rule of Three Inverſe*, Multiply the firſt, ſecond, and laſt Numbers together for Dividend, and the third and fourth for Diviſor, as in the following Example.

Example. *If* 50 l. *in* 10 *Months require* 2 l. 10 s. *Intereſt, Of what Principal ſhall the Intereſt of* 6 l. *make in* 12 *Months?*

l. *mo.* *l.* *s.*
If 50 —— 10 —— 2 —— 10
12 —— 6 50
10

l. *s.*
2 —— 10 500
facit 100 *l.* 12 6

3|0) 300|0

facit 100 ——

This laſt being a Queſtion in the Rule of Three Inverſe, according to the Directions given in the Fifth Rule of this Chapter, I multiply the firſt ſecond, and laſt Numbers together for Dividend, which produces 3000. Then I multiply 2 l. 10 s. my third Number by 12, my fourth Number, and ſay 12 times 10 s. is 120, I put down a (0) and carry 6 *l.* to the place of Pounds, and ſay, 12 times 2 is 24 and 6 I carried is 30 for my Diviſor. Then I divide and the Quotient is 100 *l.* being the Principal that 6 *l.* Intereſt will make in 12 Months, which was to be proved.

But a more particular Application ſhall be made of the Double Rule of Three, when we come to treat of Simple Intereſt.

CHAP. XI.

Of Exchange.

HAving Explained the Nature of the Rule of Three, and the manner of Reſolving Queſtions therein, I am naturally led to treat of its particular Uſe in the Exchange of Coyns.

In the Exchange of Coyns, it is neceſſary that the *Par* or *Value* of the *Mony* in each place be exactly known. For the Word *Par* ſignifies to Equalize the Mony of Exchange from one *Place* with that of *another Place.* As when I *take* up ſo much *Mony* per Exchange in one Place, to *pay* the juſt *value* thereof in *another* kind of *Mony* in another *Place*, without having Reſpect to the price Currant of Exchange for the ſame, but only to what the Mony does currantly paſs for in each place. From whence may be eaſily found out the *Profit* and *Loſs* of all *Monys* Drawn, or Re-

Remitted *by Exchange*. But this *Par* being grounded principally upon the *Currant Value* of Coyn, the Plenty and Scarcity thereof the Riſing and Falling, Inhanſment and Debaſing of the ſame, it muſt neceſſarily follow, that the Value of Coin is Subject unto Change. An Example whereof you have in *France*, where their Coin has been Changed, Inhanſed and Lowred for ſeveral times in a few Years; and in this preſent Year, 1702. the French Crown which was 60 Sous or 3 Livers, is now raiſed to 75 Sous or 3 Livers 15 Sous.

The Denomination in which *England*, and the following Places Exchange each with other are, *Viz.*

The Exchange of Monies *from London* to Antwerp, Amſterdam, Hambrough, Liſle, Midleborough and other parts of Flanders and Holland, is *Valued on the Pound Sterling* of 20 Shillings. That is to *pay* after the rate of ſo many Shillings, and Pence *Flemiſh* for every Pound Sterling.

The Exchange from *London* to Paris, Roan, and moſt parts of France is *Valued* on the *French Crown* at 54 *d.* that is to *pay* ſo many *Pence*, or ſo many *Shillings* and *Pence Sterling*, for the French Crown.

The Exchange from *London* to *Venice* is made on the *Duccat* at 52 *d.* Sterling, to pay ſo many *Pence* and parts of a *Penny Sterling* for every Duccat.

The Exchange from *London* to Leghorn, Genoa, Cales, Madrid, and other parts of *Spain*, is *made* on the *Dollar* or *Piece of Eight*, at 54 Pence Sterling, that is to pay ſo many *Pence* on parts of a Penny *Sterling* for every Dollar.

The PAR at Antwerp, Amſterdam, Hambrough, Liſle, Midleborough and other parts of Flanders with our Pound Sterling, is *thirty three Shillings* 4 Pence Flem. for a *Pound Sterling*, which 33 Shillings 4 d. do make 10 Guilders at 2 Shillings Sterling the Guilder, or 10 Livers Tournois.

The PAR at Paris, Roan, and other Parts of *France*, has been reckoned ſome times at 71 Sous the Crown of 3 Livers Tournois, generally at 60 Sous the Crown of 3 Livers, every Liver valued at 1 Shilling 6 Pence Sterling, the Crown valued at 4 *s.* 6 *d.* Sterling.

The PAR at Leghorn, Madrid, Cales, Genoa, is at 54 *Pence Sterling* for the Dollor or Piece of Eight.

The PAR at Venice with our *Sterling Money* is at 6 Livers 4 Sous of Venice per Duccat, or 51 Pence Sterling, ſometimes 52 Pence.

The Hambrough PAR is ſometimes reckoned at *Four* Ricks Dollars and a half, which makes 32 Shillings *Flemiſh* for 20 Shillings Sterling.

The PAR at Lisbon is at 6 *s.* 8 *d.* ½ Sterling on the Milrea or 1000 Reas.

The PAR at Oporto is the ſame as that at Lisbon.

The Value of the moſt uſual Coyns with which England *does chiefly Exchange are,* viz.

		Sterling s.	*Mony* d.
Holland & *Flanders.*	1 Stiver is	0	1 $\frac{1}{5}$
	6 Stivers of 1 Shilling Flemiſh is	0	7 $\frac{1}{5}$
	20 Stivers is 1 Guilder or	2	0
	6 Guilders a Pound Flem. of 20*s.* is	12	0
	33 Shill. 4*d.* Flemiſh is	20	0
	1 Zeland common Dollar is	3	0
	1 Duccatoon	6	0
	1 Specie Dollar	5	0

		s.	*d. q.*
France.	12 Deneers or 1 Soulz is	0	0 3 $\frac{3}{5}$
	20 Soulz or 1 Liver is	1	6
	3 Livers or 1 French Crown	4	6

		Sterling s.	*Mony* d.
Spain.	a Mervid is about $\frac{1}{8}$ and $\frac{1}{4}$ of $\frac{1}{8}$ *d.*	0	0 $\frac{5}{37}$
	34 Mervides is a Rial or about	0	4 $\frac{3}{4}$
	11 Rials plate is 1 Duccat or	4	4 $\frac{1}{4}$
	10 Rials plate 1 piece of Eight or	4	0
	1 Rial *Copper* (is called) *Velloon* or	0	3 $\frac{1}{5}$
	15 Rials *Copper* 1 Ps. of eight is about	4	0

☞ *Note the Rial was formerly valued at 6 pence Sterling or very near it, and then 8 Rials was 1 Piece of* $\frac{8}{1}$, *but the Mony is of late years altered.*

		Sterling s.	*Mony* d.
Portugal.	12 $\frac{1}{2}$ Reas of *Portugal*	0	1
	1 Mil Rea or 1000 Reas	6	8
	1 Feſtoon is	1	3

1 Liver.

		Sterling Mony s.	d.
Italy.	1 Liver at *Leghorn* is	0	9
	1 Crown Currant at *Florence* is	5	3
	1 *Duccat de Banco* at *Venice* is	4	4
	1 St. Mark	2	10
	1 Palarmo Florin is	2	6
Germany.	1 Rix Dollar of the Empire	4	5 ¼
	4 ½ Rix Dollars make 32 Flem. at *Hambroug*, &c.	20	0
	1 Guilder of *Noremburg* is	7	1

A Merchant in London *remits to* Roterdam 375 *l.* 10 *d. Sterling, at* 34*s* 8 *d. Flemiſh for* 20 *Shillings Sterling, How many Guilders Flemiſh muſt be paid at* Roterdam, *and what is gained per Exchange.*

```
s.                 s.  d.                  lb.    s.  d.
20 Ster. ————————— 34 : 8 Flem. what     375  :  10 :
                   12                      20
                  ————                   ————
                   416                    7510
                                           416
                                         ————
                                          45060
                                          7510
                                         30040
                                         ————
Guilders : Stiver                    2|0) 312416|0
fa. 3905  :  4.                      ——————————
                                       2) 15620|8
                                      ——————————
                                     2|0) 7810|4
                                      ——————————
                                          3905
```

To find the *Gain* or *Loſs* in one Pound, Subtract 33*s.* 4*d.* out of 34*s.* 8*d.* the Courſe of Exchange, the difference is 1*s.* 4*d.* *Flem.* *per* Pound, and ſo much Gain is the Courſe of Exchange in our Favour.

If the Courſe of the Exchange be under Par, it muſt by Parity of Reaſon become a *Loſs* to us, and then the Courſe of Exchange is to our Prejudice.

The like is to be obſerved for the Coins Exchanged in all other Countries.

I will give but one Example of *Loſs* by Exchange, by which, with the foregoing Example of *Gain*, the ingenious may with eaſe travel through the General Courſe of Exchange with all Countries.

A Merchant in *London* remits a Bill of Exchange to *Amſterdam* for 297*l.* 15*s.* Sterling, at 31*s.* 3*d.* *Flem.* for 20*s.* Sterling. I demand how much *Flemiſh* Money was paid for the ſaid Bill in *Amſterdam*, and what is loſt *per* Pound by the Exchange.

s. s. d. l. s.
20 31 : 3 *Flem.* 297 : 15 *Sterling.*

Guild. *Shill.*
Anſwer 2791 : 8 paid, and
2*s.* 1*d.* *Flem.* *per* Pound loſt by
the Exchange.

P R A-

PRACTICAL TABLE.

s.	*d.*	*l.*	*d.*	*s.*	℔.	*C.wt*
10	0	$\frac{1}{2}$	6	$\frac{1}{2}$	56	$\frac{1}{2}$
6	8	$\frac{1}{3}$	4	$\frac{1}{3}$	84	$\frac{3}{4}$
5	0	$\frac{1}{4}$	3	$\frac{1}{4}$	28	$\frac{1}{4}$
4	0	$\frac{1}{5}$	1$\frac{1}{2}$	$\frac{1}{8}$	14	$\frac{1}{8}$
3	4	$\frac{1}{6}$	1	$\frac{1}{12}$	16	$\frac{1}{7}$
2	6	$\frac{1}{8}$			8	$\frac{1}{14}$
2	0	$\frac{1}{10}$			7	$\frac{1}{16}$
1	8	$\frac{1}{12}$				

I. *When the given Price is Pence, take your parts in Shillings*, the Product divided by 20, gives the Anſwer in Pounds.

OR, you may bring it into Pounds, at once, by cutting off the laſt Figure, and by conſidering that 240 Pence is one Pound, whereof 8 *d.* is $\frac{1}{30}$. 6 *d.* is $\frac{1}{40}$. 4 *d.* is $\frac{1}{60}$. 3 *d.* is $\frac{1}{80}$. 2 *d.* is $\frac{1}{120}$.

Example 1.

254 ℔ of Tobacco at 1 *d.*
d. 1 | $\frac{1}{12}$ | 2|1 : *d.*
l. 1 : 1 : 2 *facit.*

254 ℔. at 2 *d.*
d. 2 | $\frac{1}{6}$ | 4|2 : 4
l. 2 : 2 : 4 *facit.*

716 Ells at 3 *d.*
d. 3 $\frac{1}{80}$ | *s.* *d.*
l. 8 : 19 : 0 *facit.*

215 ℔. at 4 *d.*
d. 4 $\frac{1}{60}$ | *s.* *d.*
l. 3 : 11 : 8 *facit.*

643 Gall. at 6 *d.*
d. 6 $\frac{1}{40}$
l. 16 : 1 : 6 *facit.*

The three laſt Examples are brought into Pounds at one Operation, after which manner any Sum in Practice may be readily caſt up.

Here you ſee that 254 ℔. of Tobacco at 1 *d.* a Pound, divided by the $\frac{1}{12}$ gives 21 *s.* 2 *d.* and that divided by 20 (by cutting off the laſt Figures and taking $\frac{1}{2}$ of it) gives 1 *l.* 1 *s.* 2 *d.* the Price of 254 ℔. of Tobacco; and for 2 *d.* a ℔. take the $\frac{1}{6}$; becauſe 2 *d.* is the $\frac{1}{6}$ part of a Shilling, and for 3 *d.* a ℔. take $\frac{1}{4}$; and ſo for the others at 4 *d.* and 6 *d.*

II. *When the given Price are ſuch Pence, as are no even part of a Shilling,* take firſt the greateſt even part of a Shilling, and then part of that part; add them together, and divide the Product by 20, or cut off the laſt Figure and take $\frac{1}{2}$.

d.		2121 Ells a 5 *d.*
4	$\frac{1}{3}$	707
1	$\frac{1}{4}$	176 : 9 *d.*
5.		88|3 : 9
		44 : 3 : 9 *facit.*

		784 ℔. at 7 *d.*
6	$\frac{1}{2}$	392
1	$\frac{1}{6}$	65 : 4 *d.*
1		45|7 : 4 *d.*
		22 : 17 : 4 *facit.*

254 ℔.

254 lb. of Tobacco at 9 *d.* and 10 *d.* ¼ a lb.

d.		
6	½	127
3	½	63 : 6
9		19|0 : 6
	¼	9 : 10 : 6 *fa.*

d.		254 at 10 *d.* ¾.
6	½	127 ſhill. in 254 ſix pence.
4	⅓	84—8 in 254 groats.
½	⅛	10—7 in 254 half pence.
¼	½	5—3½ in 254 farthings.
		22|7 : 6 ½
		11|7 : 6 ½. *fa.*

Demonſtration. In 254 lb. of Tobacco at 10 *d.* ¼ a lb. there muſt be 254 Sixpences, which is 127 Shillings, and 254 Groats, which is 84 *s.* 8 *d.* and 254 Half-pence, which is 10 *s.* 7 *d.* and 254 Farthings, which is 5 *s.* 3 *d.* ½, all theſe added together, make 227 *s.* 6 *d.* ½, which divided by 20, gives the *facit*, 11 *l.* 7 *s.* 6 *d.* ½.

		614 lb. at 11 *d.*
6	½	307
4	⅓	204 : 8 *d.*
1	¼	51 : 2
11		56|2 : 10
		28|12 : 10 *facit.*

		563 lb. at 12 *d.* ½
6	½	281 : 6 *d.*
4	⅓	187 : 8
1½	¼	70 : 4 ½
		53|9 : 6 ½
		26 : 19 : 6 ½ *facit.*

III. *If the given Price be any Number of Pence above* 1 s. *and leſs than* 2 s. take the Aliquot parts in Pence, (as in the laſt precedent) to which add the given Quantity for the 1 *s.* and proceed as before.

Example

Example.

d. 3

254 ℔. at 15 *d.*
$\frac{1}{4}$ 63 : 6

31|7 : 6

15 : 17 : 6 *facit.*

254 at 17 *d.*
$\frac{1}{3}$ 84 : 8
$\frac{1}{4}$ 21 : 2

35|9 : 10

17 : 19 : 10 *facit.*

---

264 *yds.* at 18 *d.*
$\frac{1}{2}$ 132

39|3

19 : 16 : 0 *facit.*

295 *gall.* at 19 *d.*
$\frac{1}{2}$ 147 : 6
$\frac{1}{6}$ 24 : 7

46|7 : 1

23 : 7 : 1 *facit.*

---

672 ℔. at 22 *d.* $\frac{3}{4}$
$\frac{1}{2}$ 336
$\frac{1}{3}$ 224
$\frac{1}{8}$ 42

127|4

63 : 14 : 0 *facit.*

456 *Ells* at 23 *d.* $\frac{1}{4}$
$\frac{1}{2}$ 228
$\frac{1}{3}$ 192
$\frac{1}{4}$ 38
$\frac{1}{4}$ 9 : 6

88|3 :

44 : 3 : 3 : 6

In 672 lb. at 22 *d.* $\frac{3}{4}$ a lb. I take $\frac{1}{2}$ for 6 *d.* the $\frac{1}{3}$ for 4 *d.* and the $\frac{1}{8}$ for the $\frac{3}{4}$, because $\frac{3}{4}$ is the $\frac{1}{8}$ of 6 *d.* by which you will find that in 672 Sixpeaces there is 336 Shillings, and in 672 Groats there is 224 Shillings, and in 672 three Farthings there is 42 Shillings.

IV. *If the given Price be ſuch Shillings as are an even part of a Pound* Sterling, take ſuch a Part of the given quantity, and the Quotient is Pounds.

	Ells *s.* *d.*
	434 at 1 : 8
$\frac{1}{12}$	36 : 3 : 4 *facit.*
	674 at 2 *s.* 6 *d.*
$\frac{1}{8}$	84 : 5 : 0 *facit.*

	yrds.
	271 at 2 *s.*
$\frac{1}{10}$	27 : 2 : 0 *facit.*
	495 at 3 *s.* 4 *d.*
$\frac{1}{6}$	82 : 10 : 0 *facit.*

	Crowns.
	457 at 5 *s.*
$\frac{1}{4}$	114 : 5 : 0 *facit.*
	295 at 6 *s.* 8 *d.*
$\frac{1}{3}$	98 : 6 : 8 *facit.*

	Dollars.
	612 at 4 *s.*
$\frac{1}{5}$	122 : 8 : 0 *facit.*
	372 at 10 *s.*
$\frac{1}{2}$	186 : 0 : 0 *facit.*

In this firſt Example of 434 Ells at 1 *s.* 8 *d.* I take the $\frac{1}{12}$ becauſe 1 *s.* 8 *d.* is the $\frac{1}{12}$ of a *l.* and ſay, 12 in 43 is 3 times, reſt 7, which makes the 4 to be 74; then 12 in 74 is 6 times, reſt 2, which is 2 *l.* that I turn into Shillings, and ſay, 12 in 40 *s.* is 3 times, and there reſts 4 *s.* which I turn into Penc and it makes 48 Pence; then 12 in 48 is 4 time And the *Facit* is 36 *l.* 3 *s.* 4 *d.*

V. *If the given Price be ſuch Shillings and Pen as are no even parts of a Pound,* Multiply the give Quantity by the Number of Shillings, and take th Aliquot parts of Pence, and proceed according t the Second Rule of this Chapter.

	Ells.
	375 at 8 *s.* 6 *d.*
	8
	3000
$\frac{1}{2}$	187 : 6
	318|7 : 6
	159 : 7 : 6 *facit.*

	Ells.
	493 at 15 *s.* 10 *d.*
	15
	2465
	493
$\frac{1}{2}$	246 : 6 *d.*
$\frac{1}{3}$	164 : 4 *d.*
	780|5 : 10
	390 : 5 : 10 *facit.*

C. *s.* *d.*
295 at 12—9
12
3540
½ 147 : 6
½ 73 : 9
3761|1 : 3
188 : 1 : 3 *facit.*

C. *s.* *d.*
214 at 7—11
7
1498
½ 107
½ 53 : 6
⅔ 35 : 8
1694|4 : 2
84 : 14 : 2 *facit.*

VI. *If your given Price be any Number of Pounds, Shillings and Pence.* Reduce firſt your Pounds and Shillings into Shillings, and proceed according to the laſt Rule.

Pieces *l.* *s.* *d.*
754 at 4—03—7
83 20
2262 83
6032
½ 377
⅙ 62 : 10
6302|1 : 10
3151 : 1 : 10 *facit.*

Tun. *l.* *s.* *d.*
176 at 3—07—10
67 20
1232 67
1056
11792
½ 88
⅓ 58 : 8
1193|8 : 8
596 : 18 : 8 *facit.*

VII. *If your given Price be any Number of Pounds, and exceeding five Pound,* then Multiply your given quantity by the Number of the Pounds, and take your Aliquot part in Shillings and Pence, *viz.*

		C. l. s. d.
		74 at 11-12-6
		11
s.		814
10	½	37 d.
2½	¼	9 : 5 : 0
	l.	860 : 5 : 0 *facit.*

	hhead. l. s. d.
	394 at 16-16-8
	16
	2364
	394
½	197
½	98 : 10
¼	24 : 12 : 6
⅓	8 : 4 : 2
	6632 : 6 : 8 *facit.*

VIII. *If the given Quantity be any Number of C. qrs. or lb. or Tun C. qrs. and lb. &c.* work as before where no part is, and take your Aliquot parts in Quarters and Pounds, or in *C. qrs.* and lb. and add them to your first Work. An Example or two will make this plain.

	C.	s.	d.		C.	s.	d.
	75 ½ at	22 :	6		63 ¼ at	12 :	10
	22	11 :	3		12	6 :	5
	150				756	3 :	2½
	150			½	31 : 6	9 :	7½
½	37 : 6			⅓	21 : 0		
½	11 : 3				9 : 7 ½		
	169|8 : 9				81|8 : 1 ½ *facit.*		
	84 : 18 : 9 *facit*				40 : 18 : 1 ½ *facit.*		

In the Example of 63 *C.* ¾ at 12 *s.* 10 *d.* the *C. weight*, I multiply the *C.* by 12 *s.* and take the parts in Pence for the odd Pence; then for the ¾ of a *C.* I first take the ½ of the price of a *C.* and that makes 6 *s.* 5 *d.* the price of ½ a *C.* and then I take the ½ of that, which gives 3 *s.* 2 *d.* ½, the price of a qr. of a *C.* Add them together, it gives the price of ¾ of a *C.* which is 9 *s.* 7 *d.* ½, and must be added to your first Work. Two or three Examples more will make it familiar and easie to any Capacity.

84 *C.* 3 qrs. 11 lb. at ——— 21 *s.* 10 *d.*

21

84

168

$\frac{1}{2}$ 42

$\frac{1}{3}$ 28

18 : 6

185|2 : 6

92 : 12 : 6 *facit.*

$\frac{1}{2}$ 10 : 11

lb. $\frac{1}{2}$ 5 : 5 $\frac{1}{2}$

7 $\frac{1}{4}$ 1 : 4 $\frac{1}{4}$

4 $\frac{1}{7}$ 0 : 9 $\frac{1}{4}$

18 : 6

the price of 3 qrs 11 lb.

Tun. *C.* *qr.* lb. *l.* *s.* *d.*

12 : 14 : 3 : 14 at 15 : 17 : 06 a *Tun.*

12

190 : 10 : 00

$\frac{1}{2}$ 7 : 18 : 9

$\frac{1}{5}$ 3 : 3 : 6

$\frac{1}{8}$ 0 : 7 : 11$\frac{1}{4}$

$\frac{1}{2}$ 0 : 3 : 11$\frac{1}{2}$

$\frac{1}{2}$ 0 : 1 : 11$\frac{3}{4}$

Facit 202 : 06 : 1$\frac{1}{2}$

CHAP. XIII.

The Order of Deducting TARE *and* TRET.

GROSS is the Weight of a Commodity, with the *Hogſheads*, *Cheſts*, *Box*, or whatever elſe contains it.

TARE is the Allowance given for the Weight of the Caſk, Hogſhead, *&c.*

TRET is an Allowance of 4 lb. in 104 lb. for waſte and duſt on ſome ſort of Goods.

C. qr. lb. lb. lb.
Ex. 11 hhds. qt. 45—3—15 *Groſs Tare* 14 *per* 112
14—⅛ *how many* lb. *Neat?*
5—2—26 *Tare.*

Facit 40—0—17 *Neat.*

I. Here 14 lb. *Tare* being ⅛ of 112 lb. take ⅛ of the *Groſs*, the Quotient gives the whole *Tare*, which ſubtract from the *Groſs*, gives the *Neat* weight.

The Operation is performed thus. Divide the *Groſs* by 8, ſay, 8 in 45, 5 times, and 5 *C.* remains, which is 20 *qrs.* and 3 is 23; then 8 in 23, 2 times, 7 *qrs.* remains, which turned into Pounds by 28, and added to the 15 lb. makes 211 lb. then 8 in 211 is 26 times. So the *Tare* is 5 *C.* 2 *qr.* 26 lb.

Example

C. qrs. lb. s. d.
Example. 40 : 0 : 17 *Neat* at 22 : 6
22 lb.
14 $\frac{1}{8}$ 2 : 9 : $\frac{3}{4}$
80 2 $\frac{1}{7}$ 0 : 4 : $\frac{3}{4}$
80 1 $\frac{1}{2}$ 0 : 2 : $\frac{1}{4}$
20
3 : 4 $\frac{3}{4}$ *facit* 3 : 2 : $\frac{1}{4}$
price of 17 lb.
90| 3 : 4 $\frac{3}{4}$
45 : 3 : 4 $\frac{3}{4}$

If the *Tare* be 16 lb. in 112 lb. take $\frac{1}{7}$ of the *Groſs*, and work as before.

If 18 lb. *per* 112 lb. for *Tare*, take the Aliquot parts, *viz.*

for 16 lb. take the $\frac{1}{7}$ } Add the *Tare* of 16 and the
for 2 take the $\frac{1}{8}$ } *Tare* of 2 together, the to-
——— tal ſubtract from the Groſs, and work as before.

lb. lb. lb.
If 20 in 112 for *Tare* } for 16 take $\frac{1}{7}$. lb.
} for 4 take $\frac{1}{4}$ of 16

II. When an Allowance is made for *Tret*, then (after the *Tare* is ſubtracted from the *Groſs*) the remainder is called *ſubtle*, which divide by 26, becauſe 4 lb. is the 26th part of 104 (the Allowance always given for *Tret*.) the Quotient gives the *Tret*, which ſubtracted from the *ſubtle*, gives the *Neat* weight.

Ex.

C. qr. ℔. ℔. ℔. ℔. ℔.
Ex. 45 : 3—15 Gr. *Tare* 16 in 112 *Tret* 4 in 104
16⅐ 6 : 2 : 6 *Tare.*

39 : 1 : 9 *Subtle.* 4) 104
4 26

157
28

1265
314 26) 4405
180
4405 *pound ſubtle.* 169 245
169 *Tret.*
11
4236 *Neat pound* at 6 *d.*

6½ 211|8 *d.*

105 : 18—0 *facit.*

III. If the Allowance for *Tare* be 8 ℔, 10 ℔, 12 ℔, in 112, or any other leſſer Number, whether an Aliquot part of 112 or not, in ſuch caſes, divide the Groſs into two parts by 2, which will make it half hundreds, then ſay, 8 is ⅐ of ½ *C.* or if 12 ℔. in 112 ℔.

8⅐ } When you have found your *Tare*, ſubtract it
4⅐ } always out of the whole *Groſs*.

I might enumerate Examples, but theſe being ſufficient to inſtruct any ordinary Capacity in *Tare* and *Tret.*

I ſhall proceed to ſhew ſome other abbreviated ways of caſting up Goods and Merchandize.

CHAP.

CHAP. XIV.

For Retailers *of* ſmall Parcels, *as Mercers, Linnen, and Woollen Drapers, Haberdaſhers of Hats,* &c.

THE moſt Abbreviated and ready way is to multiply the Price by the Quantity.

s. d.
Ex. Sold 7 Yards of Cloth at 14 : 6 a Yard.
7

facit l. 5 : 1 : 6

Say 7 times 6 is 42, which is 3 *s.* 6 *d.* ſet down 6 *d.* and carry 3 *s.* to the place of Shillings, and ſay, 7 times 4 is 28, and 3 I carry is 31, ſet down 1 *s.* and carry 3 Angels to the place of Tens of Shillings, and ſay, 7 times 1 is 7, and 3 I carry is 10 Angels, which 5 *l.* ſet a (0) in the place of Shillings, and ſix the 5 *l.* in the place of Pounds, ſo the price of 7 Yards is 5 *l.* 1 *s.* 6 *d.*

s. d.
Ex. 2. Sold 11 ½ Yards at 13 : 3
11

7 : 05 : 09
6 : 07 ½

Facit l. 7 : 12 : 04 ½

For half a Yard take half of 13 *s.* 3 *d.* and add to the Product of 11 Yards.

			l.	*s.*	*d.*
Ex. 3. Sold 14 $\frac{5}{8}$ Yards at			1 :	07 :	10
					7
			9 :	14 :	10
					2
			19 :	09 :	08
$\frac{4}{8}$	$\frac{1}{2}$		00 :	13 :	11
$\frac{1}{8}$	$\frac{1}{4}$		00 :	03 :	05 $\frac{3}{4}$
		Facit l.	20 :	07 :	00 $\frac{3}{4}$

Find the firſt Price of 7 Yards, *fa.* 9 *l.* 14 *s.* 10 *d.* which multiplied by 2, gives 9 *l.* 9 *s.* 8 *d.* the price of 14 Yards, then take the Aliquot parts of $\frac{5}{8}$ for the Price of one Yard, as you ſee in the Operation; The *facit* is 20 *l.* 7 *s.* 0 *d.* $\frac{3}{4}$.

	l.	*s.*	*d.*
Ex. 4. Sold 7 C. $\frac{1}{2}$ of Currants at	2 :	13 :	6
			7
	18 :	14 :	6
	1 :	06 :	9
Facit	20 :	01 :	3

Object. There are many Numbers under 100 that are not included in the Multiplication Table, or being multiplied together, will not produce the given quantity; and ſo conſequently cannot be done by this firſt way of Practice.

Anſw. It's very true, there are ſeveral Numbers under 100, that no two Numbers multiplied together can produce them, ſuch as 13, 17, 19, 26, 29, 31, 34, 37, and many more.

Rule. In ſuch caſes multiply by two ſuch Numbers as being multiplied together, will come neareſt to ſuch odd Numbers, then multiply the price by that part which wants to make up the given quantity. An Example of which follows.

```
                      s.  d.
5. Ex. 29 Ells at 7 : 9
                        7
           ————————————
             2 — 14 : 3
                      4
           ————————————
            10 : 17 : 9
                  7 : 9
           ————————————
   facit    11 : 04 : 9
```

Here I multiply by 7 and 4, becauſe 7 times 4 is 28, and for the odd Ell to make it 29, I add the price of the Ell to the Product, *fa.* 11 *l.* 4 *s.* 9 *d.*

Example 6. If 34 Ells at the ſame price multiplied by 8 and 4, makes 32, and multiply the price of one Ell by 2, and add that to the Product, makes 34.

	C.	qr.	lb.		l.	s.	d.
7 Example.	15	3	7	at	4	15	06
							5
					23	17	06
							3
					71	12	06
					2	07	09
					1	03	10 $\frac{1}{2}$
						5	11 $\frac{1}{2}$
					l. 75	10	01 *facit.*

Goods Sold by 112 lb. the C. weight. 1. Account 2 *s.* 4 *d.* for every Farthing in the place of 1 pound weight.

	d.		lb.
Ex. 1.	At 3 $\frac{1}{2}$	the Pound, what	112
	14		32 : 8 *d.*

2. Or multiply the Pence that 1 Pound weight cost by 7, and divide by 15, the Quotient is the price in Pounds of a hundred weight.

Ex. At 5 *d.* the Pound, what cost 112?

7	Say, 15 in 32, 2 times, rest 5, which is 100 Shillings, then 15 in
15) 35	100, 6 times, rest 10, it makes 120 *d.* then 15 in 120 is 8 times,
facit l. 2-6-8	*facit* 2 *l.* 6 *s.* 8.

3. Multiply the Pounds in Money that 112 cost by 15, and divide the Product by 7, the Quotient gives the Price 1 Pound cost.

℔. *l.* *s.* *d.* ℔.

If 112 coſt 2 : 06 : 8 what coſt ——— 1

5

11 : 13 : 4

3

7) 35 : 00 : 0

facit 5 pence.

Goods Sold by 100 } 4. Multiply the Pence that 1 ℔. coſt by 5, and divide by 12, the Product is the price in Pounds.

At 15 d. the Ounce, what coſt 100 Ounces?

5

12) 75

facit 16 : 5 s.

5. Multiply the Pounds in Money 100 ℔. weight coſt by 12, and divide by 5, the Quotient gives in pence the price of 1 Pound.

℔. *l.* *s.* ℔.

If 100 coſt 6 —— 5 what coſt 1?

12

5) 75 : 00 *d.*

15 *facit* 15

Things ſold by 120, *ſuch as Deals, &c.*

6. Multiply the Pence that 1 coſt by 2, and divide by 4, the Quotient is the price of 120.

What

d.
What coſt 120 Deals at 13 the Deal-board?
2
4) 26 s.

facit 6 : 10

7. Or divide the Pence that one is worth by 2 the Quotient will be Pounds.

What coſt 120 Yards of Ribbon at 5 *d.*
facit 2 *l.* 10 *s.*

8. For things ſold by 200, annex only a Cypher to the Sum of the given Price.

What coſt a Bale of Paper, quantity 200 Reams, at 6 *s.* a Ream? *Facit* 60 *l.*

Wine or Oyl ſold by the Tun of 252 *Gallons.*

9. So many Pound the Tun coſt, abate ſo many Shillings, and the Gallon will be worth ſo many Pence.

Ex. If 252 Gallons coſt 25 *l.* what coſt 1 Gallon?
1 : 5
s. d.
23 : 15 *facit* 1 11 $\frac{3}{4}$

Here 20 *s.* is valued at 1 penny, ſo that 23 *l.* 15 *s.* is but 1 *s.* 11 *d.* $\frac{3}{4}$. the price of 1 Gallon of Oyl.

10. For things ſold by 300, annex a Cypher to the price of one, take half, and add them together.

What coſt 300 Childron of Coals at 25 *s.*
250
125

375

11. For things ſold by 500, put a Cypher to the price, then double it, take half, and add the two laſt together.

What coſt 500 Quarters of Corn, at 31 *s.* a Quarter?

310 *s.*
2

620
155

facit 775 Pound.

12. For things ſold by 900, put a Cypher and treble it.

What coſt 600 Hats at 9 *s.*

90
3

facit 270 Pound.

13. For things ſold by 600, put a Cypher, treble it, take half, and add the two laſt together.

What coſt 700 Gallons at 11 *s.*

110
3

330
55

facit 385 Pound.

There are abundance of other ſhort ways, which cannot well be compriſed in this little Tract; Theſe already given are ſufficient for any ingenious inventive Head to lay a good Foundation, from whence he may raiſe what Structure he pleaſe.

CHAP. XV.

INTEREST is either *Simple* or *Compound.*

SImple Intereſt is that which ariſeth or is computed from the Principal only. And here all Queſtions are done by the Double Rule of Three (called the Compound Rule of five Numbers) or Practice.

Example. What will the Intereſt of 275 *l.* 11 *s.* 3 *d.* come to for a Year, at 6 *l. per Cent.*

State your Queſtion by the Rule of Three, and ſay,

l. *l.* *s.* *d.*
If 100 gain 6, what will 275 : 11 : 3
6

l. 16|53 : 07 : 6

s. 10|67 : 20
l. *s.* *d.* 12
facit 16 : 108 : $\frac{10}{100}$ *d.* 8|10

Here 275 *l.* 11 *s.* 3 *d.* Principal is multiplied by 6 *l.* (the Intereſt) being the middle Number, and divided by 100 the firſt Number, by cutting off two Figures in the Dividend, reſt 53 *l.* which multiplied by 20, gives 1067 ſhillings, which divided again by 100 as before, reſt 67 *s.* which multiplied by 12, and divided as before gives *facit* 16 *l.* 10 *s.* 8 *d.* the Intereſt for 1 Year

l. *s.* *d.*
275 : 11 : 3 for a Year at 5 *l. per Cent.*
5

13|77 : 16 : 3
20

15|56
12

6|75
facit 13 : 15 : 16 $\frac{75}{100}$.

l. *s.* *d.*
275 : 11 : 3 at 5 $\frac{1}{2}$ *per Cent.*
5

1377 : 16 : 3
$\frac{1}{2}$ 137 : 15 : 7 $\frac{1}{2}$

15|15 : 11 : 10 $\frac{1}{2}$
20

3|11
12

1|42
4

l. *s.* *d.*
1|70 *facit* 15—3—1 $\frac{1}{4}$, $\frac{70}{100}$.

What comes the Inſurance of 975 *l.* 13 *s.* 4 *d.* to, at 4 Guinea's *per Cent.*

l. *s.* *d.*
975 : 13 : 4
4 : 6*s.*

3902 : 13 : 4
$5\frac{1}{4}$——243 : 18 : 4
$1\frac{2}{3}$——48 : 15 : 8

41|95 : 07 : 4 *l.* *s.* *d.*
20 *facit* 41 : 19 : 0 $\frac{3}{4}$ $\frac{52}{100}$

19|07
——12
00|88
——4
3|52

l. *s.* *d.*
275 : 11 : 3 at 5 *per Cent.* for 14 Months.

l. *s.* *d.*
The Int. of 1 Year is 13 : 15 : 06
2 Months $\frac{1}{6}$———2 : 5 : 11

facit, 16—01—05 Int. for 14 m.

l. *s.* *d.*
275 : 11 : 3 at 5 *per Cent.* for 3 Years, 5 Months, 20 Days.

The Intereſt of a Year is which multiplied by the 3 Years, and take Aliquot parts for 5 Months and 20 Days, as you ſee in the Operation.

		l.	*s.*	*d.*
		13	15	06
				3
m.	4	41	6	6
	4⅓	4	11	10
	1¼	1	2	11 ½
days	10⅓	0	7	7 ¾
	10⅓	0	7	7 ¾
produces *facis*		47	16	7

The way uſed by Bankers for caſting up Intereſt is generally by days, thus,

They bring the Principal Money into Pence, and multiply it by the Days it is out at Intereſt, and divide by 6083 for 6 *per Cent.* And 7300 for 5 *per Cent.* (which are the Days of a Year multiplied by 100, and divided by the rate of Intereſt) An Operation in the Compound Rule of five Numbers, *viz.*

If 100 *l.* in 365 days gain 6 *l.* Intereſt, what will 75 *l.* gain in 94 days?

l. *s.* *d.*

Example. 275 : 11 : 3 at Intereſt 70 Days at (6 *per Cent.*

20

12) 761 *pence* (6) 36500

5511

12

6|3 : 5

6083

66135 *fac.* 3 3 : 5

70

6083) 4629450

37135

761 6370

287

Example. 100 *l.* at Int. for 75 days at 5 *per C.*

20

facit 20 *s.* 6 *d.*

2000

12

365

100

24000

75

5) 36500

120000

7300

168000

73|00|18000|00

18000|00

340

12)246|480

facit 20 : 6 : 42

CHAP.

CHAP. XVI.

Compound Intereſt *is that which ariſeth from the* Principal, *and alſo from the* Intereſt *thereof, and therefore is called* Intereſt *upon* Intereſt.

THIS ſort of Intereſt is counted very unlawful, and is ſeldom or never allowed, but by particular Contract or Valuation of Money ſometimes on Purchaſes.

The beſt way of working this ſort of Intereſt is by Decimals.

Example. 275 *l.* 11 *s.* 3 *d.* forborn 5 years, at 6 *per Cent. per Annum*, Intereſt upon Intereſt, what will the ſame amount to?

Reduce the 11 *s.* 3 *d.* into a Decimal Fraction, according to the Third Rule of the Eighteenth Chapter of this Book.

11 *s.* 3 *d.* $\frac{135}{240}$ of a Pound *Sterling*.

Which brought into a Decimal Fraction, is 5625; the Operation of the Queſtion is, *viz.*

l. *l.*
If 100 gain 6, what will 275, 5625 —— 6
16, 5337

1 Year —— 292, 0962 —— 6
17, 5257

2 Year —— 309, 6219 —— 6
18, 5773

3 Year —— 328, 1992 —— 6
19, 6919

4 Year —— 347, 8911 —— 6
20, 8734

5 Year —— 368, 7645 —— 6

Facit 368 *l.* 15 *s.* 4 *d.*

Here the third Number is multiplied by 6, the Second Number, and divided by 100 the firſt Number, which is done by ſetting out the two firſt Figures towards the Right hand, and cutting them away as you multiply them, to abbreviate the work of Multiplications, which would be very large, were they all ſet down, where 15, or more Years Intereſt is forborn, beſides 4 or 5 places of Decimals will be correct to a Farthing or little more; ſo that the *facit* makes 363 *l.* 15 *s.* 4 *d.* the Decimal Fraction being valued according to the ſixth Rule of the eighteenth Chapter of this Book.

CHAP.

CHAP. XVII.

Rebate or Diſcount *is when a Sum of Money due at any time to come, is ſatisfied by the Payment of ſo much preſent Money, as being put forth at a certain* Rate of Intereſt *for the time being, will be equal to the Sum firſt due.*

IN *Rebate*, 12 Months is the firſt Number, the Rate of Intereſt the *ſecond*, and the time propoſed the *third* Number.

Then ſay, If 100, and that *facit* (added together) abate that *facit*, what ſhall the given Sum Rebate?

The Quotient or Quotients ſhew the Rebate; which ſubtracted out of the given Sum, ſhews the Money to be paid preſently.

Exam. What will the Rebate of 795 *l.* 11 *s.* 2 *d.* come to for 11 Months, at 6 *l. per Cent.*

If 12 Months give 6 *l.* what will 11 Months? *facit* 5 *l.* 10 *s.* Then

If 105 *l.* 10 *s.* Rebate 5 *l.* 10 *s.* what will 795 *l.* 11 *s.* 2 *d.* *facit* 41 *l.* 9 *s.* 5 *d.*

Exam. 2. The Rebate of 765 *l.* 11 *s.* 2 *d.* come to for 17 Months at 6 *per Cent.*

If 12 Months give 6 *l.* what will 17 Months; *facit* 8 *l.* 10 *s.*

If 108 l. 10 *s.* Rebate 8 l. 10 *s.* what 795 l. 11 *s.* 2 *d.* *facit* 62 l. 6 *s.* 5 *d.*

Exam. 3. Sold Goods for 795 *l.* 11 *s.* 2 *d.* to be paid at 2, 3 Months (*that is half at 3 Months, and the other half at 3 Months after that*) If all the *Money* be paid preſently, what muſt be diſcounted?

First, Divide the given Sum into two parts according to the time of Payment, as you ſee here; Then ſay,

l.	s.	d.
795	11	2
397	15	7

If 12 Months give 6 *l.* what will 3 Months? *facit* 1 *l.* 10 *s.* 2)

If 101 *l.* 10 *s.* abate 1 *l.* 10 *s.* what will 397 *l.* 15 *s.* 7 *d.* *facit* 5 *l.* 17 *s.* 6 *d.*

If 12 Months give 6 *l.* what will 6 Months give? *facit* 3 *l.*

If 103 *l.* abate 3 *l.* what will 397 *l.* 15 *s.* 7 *d.* *facit* 11 *l.* 11 *s.* 8 *d.*

Add the Sum of the Rebates together, and ſubtract it out of the given Sum, gives the *Money* to be paid preſently.

l.	s.	d.		
				795 : 11 : 2
397	15	7	for 3 Months	5 : 17 : 6
397	15	7	for 6 Months	11 : 11 : 8
			All the Rebate	17 : 09 : 2
			The *Money* to be paid preſently	778 : 02 : 0

Exam. 4. Sold Goods for 795 *l.* 11 *s.* 2 *d.* to be paid at 3, 2 Months, if all the *Money* be paid preſently, what muſt be diſcounted?

Divide the given Sum into three parts, and work as before, *facit* 15 *l.* 10 *s.* 11 *d.* $\frac{1}{2}$.

Ex. 5. Sold Goods for 795 *l.* 11 *s.* 2 *d.* to be paid at 4, 1 Months, if all the *Money* be paid down, what muſt be diſcounted? *fa.* 9 *l.* 15 *s.* 9 *d.* $\frac{1}{3}$.

Divide your Money into four payments, then work as before, *viz.*

12 *mo.*——6 *l.*——1 *mo.*——*facit* 10 *s.*
100 *l.* 10 *s.* abate 10 *s.* what will 198 *l.* 17 *s.* 9 *d.*
facit 19 *s.* 9 *d.*

12 *mo.*——6 *l.*——2 *mo.*——*facit* 1 *l.*
101 *l.* —1 *l.* —198 *l.* 17 *s.* 9 *d.* *fa.* 1 *l.* 19 *s.* 4 *d.*

12 *mo.*——6 *l.*——3 *mo.*——*facit* 1 *l.* 10 *s.*
101 *l.* 10 *s.* abate 1 *l.* 10 *s.* what 198 *l.* 17 *s.* 9 *d.*
facit 2 *l.* 18 *s.* 9 *d.*
12 *mo.*——6 *l.*——4 *mo.*——*facit* 2 *l.*
102 *l.* abate 2 *l.* what will 198 *l.* 17 *s.* 9 *d.*
facit 3 *l.* 17 *s.* 11 *d.*

l. *s.* *d.*
0 : 19 : 9
1 : 19 : 4
2 : 18 : 9
2 : 17 : 11
1 : 15 : 9

l. *s.* *d.*
795 : 11 : 2
rebated 9 : 15 : 3
Facit 785 : 15 : 9
to be paid down.

CHAP. XVIII.

FRACTIONS

Are of Two kinds { *VULGAR* and *DECIMAL.*

A *VULGAR FRACTION* is cauſed by Diviſion of whole Numbers, the Remainder of which being leſs than the Diviſor, called the Numerator, is always the Dividend, and the Denominator is the Diviſor.

$\frac{3}{4}$ Numerator. Denominator.

DECIMAL FRACTION is ſuch a one, whoſe Denominator is underſtood, and therefore need not be expreſſed: And is an *Unit* with as many Cyphers following it, as there be Figures and Cyphers in the Numerator.

Decimal Fractions, whether they ſtand alone, or be joyned with Integers, have always a Comma or Point before them to diſtinguiſh 'em from Integers; as 5 36 0042.

In *Decimals* the *value* of every Figure or Cypher *decreaſes* by a Ten-fold. Proportion from the Units place towards the *right hand*, as the whole Numbers do increaſe the value towards the *left hand*, by the like Proportion, as you may ſee in the following Table.

C Thou.	X Thou.	Thou.	C.	X.	Units		Tenths.	Hund.	Thou.	X Thou.	C Thou.
6	5	4	3	2	1		2	3	4	5	6
whole Numbers,							Decimals.				

Cyphers before Integers, and at the end, or right hand of Decimals are of no value, but after Integers and before Decimals they have their value, for in Integers they increaſe, and in Decimals they Diminiſh the value of the other Figures joyned with them.

In Integers 005 is but 5, and 004 *is* but 4, and 006 is but 6.

But in Decimals, ,005 is $\frac{5}{1000}$, and ,034 is $\frac{4}{1000}$, and ,06 $\frac{6}{60}$.

And again, in Integers 500 is five hundred, and 400 is four hundred.

In Decimals 500 is but 5, and 400 is but 4, *&c.*

Next to Abbreviation and Valuation of *Vulgar Fractions*, there is little required, but to know how to bring a *Fraction* of a *leſſer* Name into the Fraction of a *greater* Name: And to reduce *Fractions* of divers unequal *Denominations* to one common *Denominator*, which being well underſtood, you may with as much eaſe *Add*, *Subtract*, *Multiply* and *Divide* a *Fraction*, as you can a whole Number.

In *Decimals* a Fraction is ſeldom abbreviated, therefore,

1. *To abbreviate any Vulgar Fraction,* find ſuch a Number for dividing both the Numerator and Denominator thereof, ſo that no remainder be on either of the Diviſions.

Ex. Abbreviate $\frac{96}{120}$ into $\frac{8}{10}$ $\frac{4}{5}$ its loweſt term.

Say, 12 in 96, 8 times, and 12 in 120, 10, then the Fractions is $\frac{8}{10}$, then ſay, 2 in 8, 4 times, and 2 in 10, 5 times, then the Fraction is $\frac{4}{5}$, ſo that 4 is to 5, as 96 to 120.

2. *To know what part of a Pound Sterling any Number of Shillings and Pence are,* bring the Shillings and Pence into Pence for a Numerator, and place 240 under it, (the Pence of one Pound) for a Denominator.

Exam. What part of 2 *l.* is 11 *s.* 3 *d.*
$\frac{12}{135}$ *facit* $\frac{135}{240}$.

3. *To reduce Vulgar Fractions into Decimals,* Add Cyphers at pleaſure to the Numerator, and divide by the Denominator. *Example. viz.*

Reduce 11 *s.* 3 *d.* into a Decimal Fraction.

```
   12                   24|0) 1350000
  ----                 -------   150
  135                             60
  ----           facit 5625      120
  240                           -----
                                   0
```

Exam. Reduce ⅘ into a Decimal Fraction.

5) 4000

,800 *facit* ,800

4. *To value a Vulgar Fraction,* Multiply the Integer into the Numerator, and divide by the Denominator.

What is the ⅝ of a Pound *Sterling*? 20 s.

5

8|100 s.

facit 12 [illegible]

s. *d.*

An Ell worth 7 : 9 what is ⅖ worth

2

5) 15 : 6

facit 3 : 1 ⅕.

5. *To value a mixt Number,* Multiply the mixt Number by the Numerator, and Divide by the Denominator. *Exam. viz.*

l. *s.* *d.*

A Ship worth 794 : 11 : 9 what is ⅝ worth?

5

8) 3972 : 18 : 9

facit 496 : 12 : 4⅛

6. *To value a Decimal Fraction expreſſing Coin*, every *Prime* or *Unit* in the firſt place is 2 *s.* value, every 5 in the ſecond place is 1 *s.* and the reſt Farthings; but if they exceed $\frac{3}{4}\frac{5}{8}$, there muſt be one Farthing abated.

Reduce $\frac{7}{9}$ of a Pound into a Decimal Fraction.

9) ,700000

,77777

Here 7 *Primes* is 14 *s.* and 5 taken out of the ſecond place is 1 *s.* which makes 15 *s.* then 2 remains, which is 27, to the *thirds*, or place of Farthings, out of which abate 1 for $\frac{3}{4}^{5}$, it makes *facit* 15 *s.* 6 *d.* $\frac{1}{2}$, which is the $\frac{7}{9}$ of a Pound *Sterling*.

7. *To Reduce Vulgar Fractions to a Common Denominator*, Multiply the *Numerator* of each Fraction into every *Denominator*, except its own, which makes that Product *a new Numerator*; then multiply all the *Denominators* continually together, and that Product is a *Common Denominator* to all the *New Numerators*. *Example*, viz.

l. *l.*

Reduce $\frac{2}{3}$ and $\frac{3}{4}$ to a *Common Denominator*.
facit $\frac{8}{12}$ and $\frac{9}{12}$.

Here 12 is the *Common Denominator* to both the *New Numerators*, *viz.* 8 and 9, and you find that 8 is to 12, as 2 to 3, and 9 is to 12, as 3 to 4.

So that $\frac{8}{12}$ is—to $\frac{2}{3}$ and $\frac{9}{12}$—to $\frac{3}{4}$.

Reduce $\frac{3}{4}$, and $\frac{5}{6}$, and $\frac{7}{8}$ of a *l.* to a *Com. Denom.*

4			
6	18	40	42
—	8	4	4
24			
8	144	160	168
192	192	192	191

To prove your Work, Divide your *new Numerator* by the *Numerator* of that Fraction, and Divide the *Common Denominator* of the Fraction by the *Denominator*, if both Quotients are equal, your Work is true.

Example. $\frac{144}{192}|\frac{48}{48}$ here 144 divided by 3, make 48, and 192 divided by 4, gives 48, which was to be proved. Or, you may prove your Work by *Abbreviation of Fractions.* but that is attended with much difficulty, where 4 or more Fractions are reduced to a *Common Denominator.*

Now this *Reduction of Fractions* is of little uſe, otherwiſe than to prepare a Fraction to be either *Added, Subtracted, Multiplied*, or *Divided.*

As if the $\frac{3}{4}$ and $\frac{5}{6}$ and $\frac{7}{8}$ *l.* were to be added together, Reduce them firſt into a *Common Denominator*, as in the laſt Rule, it makes *facit* $\frac{144}{192}$ and $\frac{160}{192}$ and $\frac{168}{192}$. Add all the *new Numerators* together, make 472, which divided by 192, the *Common Denominator*, makes *facit* 2 *l.* $\frac{88}{192}$, as in the following Example.

Addition of Vulgar Fractions. } 144
160
168

192) 472
2) 88

l. *s.* *d.*
facit $2\frac{88}{192}$, or 9 : 2

And if the $\frac{3}{4}$ and $\frac{5}{6}$ and $\frac{7}{8}$ *l.* were, to be added together in *Decimals*, reduce them firſt into *Decimal Fractions*, according to the *Third Rule* of this Chapter, and the Operation ſtands, *viz.*

0000

Addition of Decimals. } $\frac{3}{4}$,75
$\frac{5}{6}$,8333
$\frac{7}{8}$,875

Say 4 in 30 is 7 times; and 4 in 20 is 5 times, and ſo for the reſt.

l. *s.* *d.*
facit 2.,4583 or, 2 : 9 : 2

By this Addition you ſee how much leſs work is made by *Decimals* than is in *Vulgar Fractions*, and how eaſie their Value is found out according to the *Sixth Rule* of this Chapter.

8. *To Reduce (Compound Fractions,* or*) Fractions of a leſſer Name into the Fractions of a greater.* Multiply the *Numerators* together for a new *Numerator*, and the *Denominators* multiply together for a new *Denominator.*

Reduce $\frac{1}{4}$ of a Penny into the proper Fraction of a Pound *Sterling.*

Say, $\frac{1}{4}$ of $\frac{1}{12}$, of $\frac{1}{20}$, or $\frac{1}{4}$ of $\frac{1}{240}$, *facit* $\frac{1}{960}$.

9. *To reduce a mixt number of a leſſer Name into the Fraction of a greater.* Reduce the mixt Number into an improper Fraction, and work as before:

Reduce 3*d.* $\frac{1}{2}$ into the proper Fraction of a (pound *Sterling*.)

$\frac{7}{2}$ of $\frac{1}{12}$ of $\frac{1}{20}$ or $\frac{7}{2}$ of $\frac{1}{240}$, *facit* $\frac{7}{480}$.

By the ſame *Rule* you may *Reduce* any ſort of Weight or Meaſure.

For Compound Fraction, their uſe is chiefly to bring Fractions of divers Denominations to one and the ſame Denomination.

As if the $\frac{3}{4}$ of a Penny, $\frac{2}{3}$ of a Shilling, and $\frac{7}{8}$ of a Pound were added together.

The $\frac{3}{4}$ of a Penny muſt be reduced into the Fraction of a Pound, and the $\frac{2}{3}$ of a Shilling, muſt be Reduced into the Fraction of a Pound thus,

$\frac{3}{4}$ of $\frac{1}{240}$ *fa.* $\frac{3}{960}$
$\frac{2}{3}$ of $\frac{1}{20}$ *fa.* $\frac{2}{60}$

Then the Fractions to be added, are $\frac{3}{960}$, and $\frac{2}{60}$, and $\frac{7}{8}$, which reduced to a Common Denominator, and add them together, either by Decimals, or Vulgar Fractions.

CHAP. XIX.

ADDITION of FRACTIONS.

1. IF *the Fractions to be added have one Common Denominator*, Add all the Numerators together, and divide the Product by the Common Denominator.

Example. Add $\left\{\begin{matrix}\frac{8}{12}\\ \frac{5}{12}\\ \frac{7}{12}\end{matrix}\right\}$ of a pound together.

12) 20

facit 1 $\frac{8}{12}$

2. *If the Fractions to be added be of different Denominators,* Reduce them to a Common Denominator, according to the *Seventh Rule* of the laſt Chapter, and proceed as before.

Example. Add $\frac{7}{8}$ and $\frac{3}{4}$, and $\frac{2}{3}$ *l.* together.

```
 8    —    —    —
 4   28   24    8        84
 —    3    3    8        72
32    —    —    —        64
 3   84   72   64       ————
 —    —    —    —      96) 220
96   96   96   96       ————
                 facit 2 : 28
```

To add $\frac{7}{8}$ and $\frac{3}{4}$ and $\frac{2}{3}$ *of a Pound in Decimals,* Reduce them into Decimal Fractions, according to the *Third Rule* of the laſt Chapter, and add them up as in whole Numbers, keeping the place of Units, juſt under each other.

```
        ,0000                          8)7,000
        —————                          ———————
Add  7/8 ,875                            ,875
     3/4 ,75                           ———————
     2/3 ,6666                         4),3000
        —————      l.   s.   d.        ———————
       2,2916 facit 2 : 5 : 10            75
                                       3)2000
                                       ———————
                                        ,6666
```

CHAP.

CHAP. XX.

Subtraction of Fractions.

I. TO *Subtract Fractions of different Denominators,* Reduce them to a Common Denominator, and Subtract the leſſer Fraction from the greater.

Example. From $\frac{3}{4}$ *l.* take $\frac{2}{3}$ *l.* from $\frac{9}{12}$

take $\frac{8}{12}$

$9 \quad 8$

facit $\frac{1}{12}$

II. *If you have a mixt Number, (or Integer and Fraction) and the Fraction to be ſubtracted be greater than the Fraction from which you are to Subtract.*

Borrow an Integer from the mixt Number, and work as in the Subtraction of whole Numbers.

Ex. From $11\ \frac{2}{3} \text{ — } \frac{8}{12}$

$2\ \frac{3}{4} \text{ — } \frac{9}{12}$

$8 \text{ — } \frac{11}{12}$

Here I cannot take $\frac{9}{12}$ out of $\frac{8}{12}$, therefore I borrow an Integer, *viz.* 12, and ſay, 9 out of 12, reſt 3, to which add $\frac{8}{12}$, reſt $\frac{11}{12}$, and carry 1 to 3 in 3 *l.* out of 11 *l.* reſt 8, ſo the *facit* is 8 $\frac{11}{12}$.

From 35 $\frac{3}{12}$ from 42

take 19 $\frac{7}{12}$ take 16 $\frac{15}{24}$

facit 15 $\frac{8}{12}$ *facit* 25 $\frac{9}{24}$

Subtraction of Decimals is the ſame as in whole Numbers, keeping the place of Units juſt under each other.

l. — l. s. d.
From $\frac{7}{8}$,875 — the $\frac{7}{8}$ is ——— 17 : 6
take $\frac{3}{4}$,75 — $\frac{3}{4}$ is ——— 15
s. d.
Reſt ,125 or 2 : 6 — reſt 2 : 6
equal to the Decimal, 125.

CHAP. XXI.

Multiplication of Fractions.

I. TO *Multiply proper Fractions,* Multiply the Numerators together for a new Numerator, and the Denominators multiply together for a Denominator.

Example. Multiply $\frac{7}{8}$ by $\frac{3}{4}$, *facit* $\frac{21}{32}$.

II. *If a mixt Number and a Fraction are to be multiplied together,* Reduce the mixt Number into an improper Fraction, and work as in the laſt.

Ex. Multiply $\underline{11\frac{2}{3}}$ by $\frac{3}{4}$

$\frac{35}{3}$ by $\frac{3}{4}$, *facit* $\frac{105}{12}$.

l. l.
Ex. Multiply $\underline{11\frac{2}{3}}$ by $\underline{2\frac{3}{4}}$

l. s. d.
$\frac{35}{3}$ by $\frac{11}{4}$, *fa.* $\frac{385}{12}$ or 32 : 1 : 8.

III. *To Multiply a mixt Number by an Integer,* Make the Integer an Improper Fraction by placing [1] under it, and Reduce your mixt Number into an improper Fraction, and work as in the *firſt Rule.*

Ex.

Example. Multiply $7\frac{5}{8}$ by 4.

$\frac{61}{8}$ by $\frac{4}{1}$, *facit* $\frac{244}{8}$.

IV. *Multiplication of Decimals* is the ſame as in whole Numbers, ſaying as many Decimal parts as are in the Multiplicand and Multiplier, ſo many muſt be cut off from the Product, which if it have not ſo many places, the defect muſt be ſupplied with Cyphers towards the left hand.

		11,83
Multiply	,1005	2,87
by	,031	
	1005	8281
	3015	9464
		2366
facit	,0031155	33,9521

CHAP. XXII.

DIVISION of FRACTIONS.

I. TO *Divide Single Fractions:* Reduce them to a Common Denominator, and Divide the new Numerator of the Dividend, by the new Numerator of the Diviſor.

Example. Divide $\frac{7}{8}$ by $\frac{3}{4}$; 24) 28

28 24 *facit* $1\frac{4}{24}$

II. If it happens that the Fraction of the *Diviſor* be greater than the Fraction of the *Dividend*, after you have Reduced them to a Common Denominator, the *facit* of ſuch Diviſion is a Fraction.

Example. Divide $\frac{3}{4}$ by $\frac{7}{8}$.

$$\overline{24} \quad \overline{28} \text{ facit } \frac{24}{28}.$$

III. *To Divide an Integer by a Fraction*, Multiply the Integer into the Denominator, and Divide by the Numerator.

Example. Divide 8 by $\frac{5}{6}$.

$$5)\ \overline{48}$$

$$\text{facit } 9\tfrac{3}{5}$$

IV. *To Divide a Fraction by an Integer*, The Numerator is Numerator, and the Integer multiplied by the Denominator, is Denominator.

Example. Divide $\frac{3}{4}$ by 3,

$$\begin{array}{l} 4 \\ 3 \\ \hline 12 \text{ facit } \frac{3}{12} \end{array}$$

V. *To divide a mixt Number by an Integer*, Reduce the mixt Number into an improper Fraction, whoſe Denominator multiply by the Integer for your Diviſor.

Divide $3\frac{3}{8}$ by 2

$\frac{27}{8}$ by $\frac{2}{1}$ 16) 27
1 —— $\frac{11}{16}$ *facit* $1\frac{11}{16}$.

VI. *To Divide a mixt Number by a Fraction,* Reduce the mixt Number into an improper Fraction, and work as before.

Example. Divide $3\frac{3}{4}$ by $\frac{4}{7}$

$\frac{15}{4}$ by $\frac{4}{7}$

105 16) 105
9
facit $6\frac{2}{16}$.

VII. *To Divide an Integer by a mixt Number,* Reduce the mixt Number and Integer into improper Fractions, and proceed as before.

Example. Divide 5 by $\frac{3}{5}$

$\frac{5}{1}$ by $\frac{18}{1}$ 18) 25
7
facit $1\frac{7}{18}$

VIII. *To Divide a mixt Number by a mixt Number,* Reduce them into improper Fractions and Divide as before.

Example. Divide $3\frac{3}{5}$ by $2\frac{3}{4}$

$\frac{18}{5}$ by $\frac{11}{4}$ 55) 72
facit $1\frac{17}{55}$ 17

Diviſion of Decimals is the ſame as in whole Numbers, till the Work be done. And then uſe the Converſe of the Rule for Multiplication, *viz.* ſo many *Decimals* as are in the Dividend, ſo many there muſt be in the *Diviſor* and *Quotient:* And if there be not ſo many, the *Quotient* muſt be ſupplied with Cyphers towards the left hand.

Example. Divide 33,9521 by 2,87

2,87) 525

2382

facit 11,83 861

00

See the Converſe in Multiplication of Decimals.

CHAP. XXIII.

The Rule of Three in Fractions.

RULE: You muſt multiply your Second and Third Numbers together, and divide by your Firſt.

Obſerving the ſame Method as in whole Numbers, *viz.* That the firſt and third Numbers be of one Name or Denomination.

Ex. If $\overset{d.}{3\frac{1}{2}}$ buy $\overset{lb.}{\frac{2}{3}}$ of *Tobacco,* what ſhall $\overset{l.}{95\frac{3}{4}}$ buy?

$\frac{7}{2}$ of $\frac{1}{240}$

$\overset{l.}{\frac{7}{480}}$ —— $\overset{lb.}{\frac{2}{3}}$ —— $\overset{l.}{95\frac{3}{4}}$

4

$\frac{383}{4}$ by $\frac{2}{3}$

$\frac{766}{12}$ *facit.*

Divide $\frac{766}{12}$ by $\frac{7}{480}$

```
                 7    766
               ———   ————
                84   2880
                    2880
                   3360
                  ——————
           84)   367680
        ———        316
facit 4377 lb. 648
of Tobacco        600
                 ————
                   12
```

CHAP. XXIV.

Menſuration of Plain Superficies.

The Menſuration of plain Superficies (or Flat Meaſure) *ſuch as Board, Glaſs, Wainſcot, Painting, and the like.*

Note 1. THAT in *Superficial Meaſure*, 12 times 12 Inches, being 144 Inches, are the Number of Inches contained in a Square Foot of Superficial Meaſure.

2. That to ſquare any Number, is to multiply it in it ſelf, as if you wou'd know how many ſquare Feet is contained in a Yard ſquare. Multiply 3, the Feet in one Yard by 3, the Product is 9, and ſo many Feet make a Yard ſquare.

Example. How many ſquare Inches are there in a Yard ſquare?

1 Yard is 3 Feet
12
——
36 Inches
36
——
216
108
——
facit 1296 Inches.

General Rule is to multiply the length by the breadth, the Product is the Content.

Ex. 1. A Board 12 Foot long, and 14 Inches broad, how many ſquare feet?

12
——
144
14
——
576
144
——
144) 2016 Inch.
facit 14 feet 576
——
00

Inch 12 foot
$1\frac{1}{6}$ —— 02
——
facit 14 ſquare feet

But the beſt way is to take Aliquot parts for 14 Inches, as you ſee wrought in the laſt Example. And this being the moſt practical and ready way, I ſhall purſue it in all the Variety of Superficial Menſuration that followeth.

Exa-

Ex. 2. A piece of Wainſcot 24 Foot, 9 Inches long, and 11 foot deep, how many ſquare Yards?

foot inch.
24—9
11 Mult.

9) 272—3

facit 30-0-8

Or thus,

yd. fo. in.
8—0—9 long.
3—2—0 deep.

24—2—3
1 $\frac{1}{3}$ —2—2—3
1 $\frac{1}{3}$ —2—2—3

facit 30—0—9

Here 24 Foot 9 Inches is multiplied by 11 Foot, the height, which makes 272 Foot 3 Inches, that divided by 9, gives 30 Yards, 8 Inches, and $\frac{3}{4}$.

But the eaſieſt and beſt way is to bring the height and length into Yards, and then multiply them as you ſee in the Example following.

Example 3. A Painter hath done a Room 98 Foot about, and 11 $\frac{1}{2}$ Foot high, I demand the ſquare Yards therein?

yd. fo. in.
32—2—0
3—2—6

98—0—0
1 $\frac{1}{3}$—10—2—8
1 $\frac{1}{3}$—10—2—8
6 $\frac{1}{2}$— 5—1—4

Facit 125—0—8

foot
3) 98

32—feet

yds. feet in.
Anſ. 125—0—08

Example. A *Glaſier* hath done a Pane of Glaſs of 5 Foot, 73 high, and 2 Foot, 54 broad, at 6 *d.* the Foot ſquare.

Note, The *Glaſiers* Foot is divided into 10 parts, and every part into 10 parts more.

5, 73
5, 54
2292
2865
1145
14, 5542 foot

Facit 14 ½ or 14, 5542

A General Rule to Meaſure Round or Square Pillars.

Multiply the length by the Circumference or *Round Pillars.*

And for *Square Pillars*, add the four ſides or Breadth together, and Multiply the Total by the Length.

Example 5. A Painter hath done a Pillar of 6 Foot 3 Inches Circumference, and 14 Foot 9 Inches long. I demand the Square Yards of Painting?

yrd. fo. in.
4 — 2 — 9 length.
2 — 0 — 3 circumf.
inch 9 — 2 — 6
36 — 3 ½ 0 — 1 — 1 $\frac{9}{12}$
facit 10 — 1 — 0 $\frac{9}{12}$

Example 6. A Pillar 6 Yard 2 Foot 9 Inches long, and 2 Foot 1 Inch in breadth each ſide, how many ſquare Yards?

yrd. fo. in.
6——2——5 length.
3——0——0 breadth.

yrd. fo. in.
3—0—0 broad. *facit* 20——1——3

For *Regular Poligons*, add all the ſides together, and multiply the Total by the length.

For *Cones*, multiply half the length by the Circumference.

For *Pyramids*, add all the breadths at the Baſe together, and multiply half the length by the Total.

For *Globes*, Multiply the Arrea of the Circle by 4, it gives the Content.

CHAP. XXV.

Menſuration of Solids.

Solids, *ſuch as Stone, Timber,* &c. *are Meaſured by the* Cubick *or* Solid *Foot, now a Cube is a Figure like a Dye of 6 equal ſides, and a* Cubick *Foot contains 12 Inches Square on every ſide.*

THE *Rule is*, Multiply the length by the breadth, and that Product multiply by the depth, which divide by 1728, the Cubick Inches in a Foot Solid.

Example.

A Piece of Timber 16 foot long, 14 Inches broad, and 9 Inches deep, How many ſolid Feet doth it contain?

```
      12                  16
      12                  12
    ----                ----
     144                 192
      12                  14
    ----                ----
    1728                 768
                        192
                        ----
                        2688
                           9
                        ----
               1728) 24192 facit 14 foot
               ----   6912
                14    ----
                       000
```

Example

Example.

A Stone 7 Foot 3 Inches long, 4 Foot 5 Inches broad, and 2 Foot 3 Inches deep, How many ſolid Foot?

```
     7—3            4—5          2—3
     12             12           12
    ----           ----         ----
     87 length      53           27
     53 breadth
    ----
    261
   435
   -----                  1728) 124497
   4611                  ------   3537
     27 deep             facit 72 ------
   -----                 ſolid feet 81
   32277
   9222
  ------
fa. 124497 Cubick Inches.
```

To find how many Inches in length make a Foot of Square Timber, Multiply the Number of Inches ſquare in it ſelf for Diviſor, and make 1728, the Cubical Inch of a Foot, your Dividend.

Example.

Example.

A Piece of Timber 18 Inches ſquare, What length will it require to make a Foot ſolid?

18
18
144
18
324) 1728
facit 5 In. 108

Example.

How many Inches in length will make a Foot at 12 Inches Square?

12
12
144) 1728
288
facit 12 In.
00